



Electronic Typewriter

Adjustment Parts Manual

November, 1982

SR-28-0088-0

IBM Electronic Typewriter 50
IBM Electronic Typewriter 60
IBM Electronic Typewriter 75
IBM Electronic Typewriter 85

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SAFETY PRECAUTIONS

All IBM customer service representatives are expected to take every safety precaution possible and observe the following safety practices when servicing IBM equipment.

Mechanical Safety:

1. *Safety glasses must be worn.*
2. *All safety devices, such as guards, shields, signs, and ground wires, must be restored after maintenance. When a guard or shield is removed to observe or make an adjustment, that shield must be replaced when work in the area is completed.*
3. *Watches, rings, necklaces, ID bracelets, or other jewelry must be removed when servicing the machine.*
4. *Care must be used when working near moving parts. Keep hair away from moving parts. Avoid wearing loose clothing that might be caught in the machine. Shirt sleeves must be kept buttoned or rolled above the elbows. Ties must be tucked in the shirt or have a tie clasp approximately three inches from the end. Tie chains are not recommended.*

Electrical Safety:

1. *The equipment referenced in this manual may use high voltages. Check voltage labels!*
2. *Safety glasses must be worn when checking energized circuits.*
3. *If a circuit is disconnected for servicing or parts replacement, it must be reconnected and tested before allowing the use of the machine.*
4. *Power should be removed from the machine for servicing whenever possible. Remember, when checking voltages, avoid contacting ground potential, such as metal floor strips or machine frame.*
5. *Meter continuity check should be used instead of voltage checks whenever possible.*
6. *Do not apply power to any part, component, or subassembly when it is not physically mounted in the machine.*

General Safety:

1. *Each customer service representative is responsible for ensuring that no action on his/her part makes the product unsafe or exposes customer personnel to hazards.*
2. *Store the removed machine covers in a safe, out-of-the-way place where no one can trip over them.*
3. *If you must leave the machine in a down condition, always install the covers and disconnect the power before leaving the customer's office.*
4. *Always place the CSR tool kit away from walk areas where no one can trip over it.*
5. *Maintain safe conditions in the area of the machine while performing and after completing maintenance.*
6. *Before starting the equipment, make sure fellow CSRs and customer personnel are not in a hazardous position.*
7. *All machine covers must be in place before returning the machine to the customer.*

NOTE: *Refer to the Safety CEMs relating to this product(s) for further safety precautions.*

INTRODUCTION

This manual is written for both U.S. and World Trade usage. It contains an adjustment section, a parts manual section, and a diagnostics section for the following products:

Product Name	Product Code
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ADJUSTMENT SECTION

Purpose

This section provides a reference for the most commonly used adjustments. Refer to other product service publications if additional information is needed.

Adjustment Identification

The headline of each page shows the product name, product code and the name of the mechanism covered on that page. Each adjustment is indicated by a black frame number on the top left corner, followed by the adjustment name and mechanism code/reference number. If one frame covers adjustments for more than one product or product level, they are indicated by the product name and/or the level number. The machine mode, the view of the drawing and safety precautions are also noted when required.

Adjustment Sequence

The frame numbers indicate the sequence of adjustments. One adjustment could affect a following adjustment. Therefore, check all the following adjustments in that mechanism.

Red numbers on the bottom left corner of the frame indicate adjustments out of sequence that could be affected and should be checked.

Adjustment Procedure

The part to be adjusted is colored red and a red arrow shows the direction of movement. Tolerances and/or additional information on how to perform the adjustment are shown when required.

Always use the adjustment tolerance shown in the publication with the latest date.

Call Reporting

Use the mechanism codes/reference numbers shown after the frame number and frame name for call reporting. The reference number is not always the number of the part that is colored red.

DIAGNOSTICS SECTION

Functional Check — Provides a reliable procedure to test the different mechanisms and functions.

Printer Exerciser — Provides an explanation of the CE aid, printer exerciser, Models 50/60/75.

Service Tips — Improved techniques for various adjustments and/or procedures.

Component Layout — May be used to physically locate components.

Sequence Charts — Provide the sequence of operation for various machine operations.

Static Voltage Checks — May be used to isolate a failing component.

Wiring Diagrams — May be used to check wiring connections and static or active voltages.

Combination Code Chart — May be used to determine the make-up of a particular character or function. Listed are the reed switches, solenoids, selection pins, character velocities, velocity magnet chart, reed layout and selection solenoid layout.

Typehead Layout Chart — May be used to locate character positions and required bail reed switches.

Diagnostic Charts — These charts may be used when experiencing character substitution failures.

Primary/Motor Wiring Diagrams — Show main electrical connections and motor connections.

Lubrication Guide — Lists lubrication locations and type of lubricant.

Removal List — A list of removals explained in the service manual.

PARTS MANUAL SECTION

Introduction

This section contains parts drawings of mechanisms, reference numbers and other special information. It must be used with a separate part number/price list which contains reference numbers, part numbers, part descriptions and prices.

Mechanism Identification

The headline of each page shows the product name and product code covered on that page. The headline of each frame shows the mechanism name and the mechanism code covered in that frame. Some frames will show a model identification code after the mechanism name. Some mechanisms require more than one frame. However, each mechanism consists of a group of parts that work together to perform a function.

Part Identification

Red numbers indicate the reference number of a part, a bill of material (B/M) or an assembly.

(Continued from page 1)

Red blocks within a frame indicate either one or a combination of more than one of the following:

- Differences between features.
- Different levels within the same model (level 1, level 2, etc.).
- Field replacement parts.
- Bill of material (B/M) or assemblies (shown with a description — parts shown in the drawing).
- World Trade application or differences.

If different levels exist, which can be used for all models, only the newest level is shown in the drawing. However, the part number/price list will show all level parts.

Some parts are shown for assembly purposes only and do not show a reference number. Replace these parts by ordering either the assembly or a later level part.

Parts Ordering

Locate the mechanism in which the part functions by using the contents page. Note the mechanism code, find the part in the drawing, and note the reference number. Use this mechanism code/reference number to locate the part number and price in the part number/price list manual.

World Trade should use the country's procedures to find the prices.

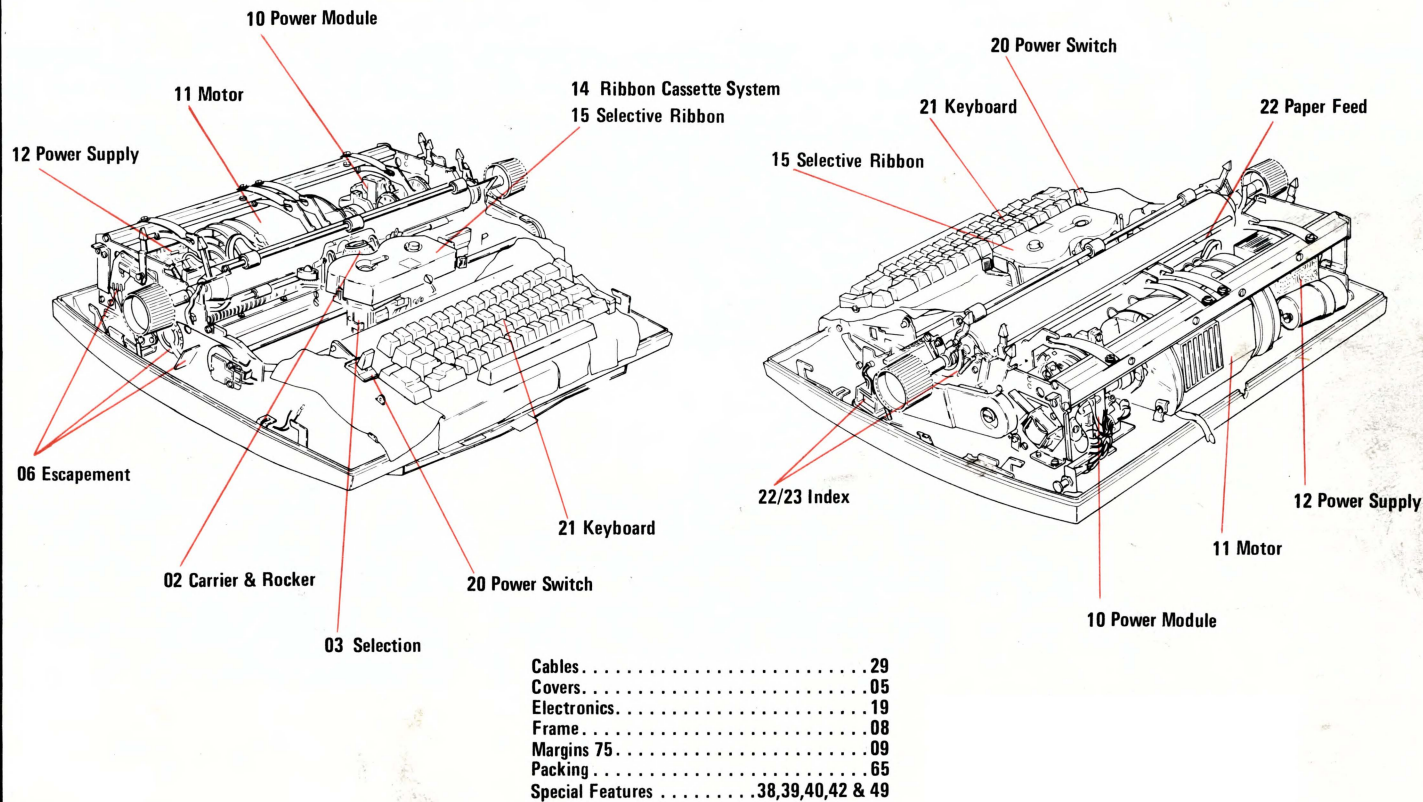
Features and devices (MESs) or specification changes (SERs) desired by the customer must be ordered through CSR management and Branch Office sales.

Replacement parts for features, devices and SERs not shown in the parts manual must also be ordered through CSR management and Branch Office sales.

COMMON ABBREVIATIONS

The following list is provided as a reference for some of the common abbreviations used in this manual. It should be noted that some of these are new since the last revision.

APM	Adjustment Parts Manual
ASM	Assembly
B/M	Bill Of Material
CC	Cycle Clutch
CR	Carrier Return
CSI	Combined Service Information
FI	Field Installable
g	Grams
LCPI	Lighted Carrier Position Indicator
LED	Light Emitting Diode
mm	Millimeters
N	Newton
PN/PL	Part Number/Price List
PFB	Print Feedback
PSCC	Print Shaft Cycle Clutch
RCS	Ribbon Cassette System
SB	Spacebar
W.T.	World Trade



ELECTRONIC TYPEWRITER

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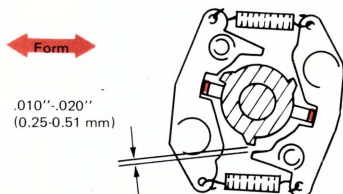
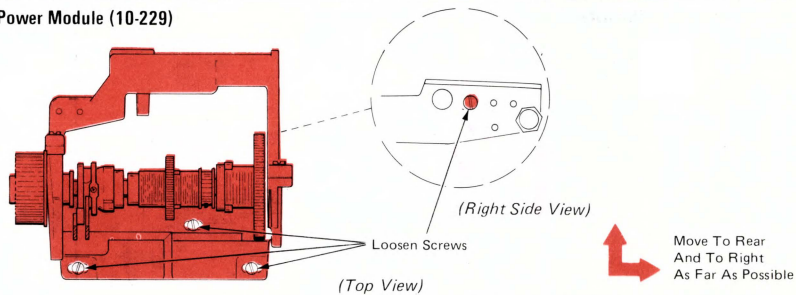
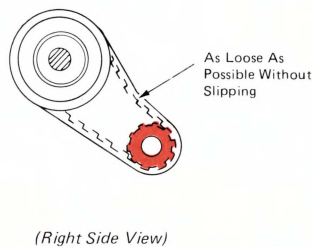
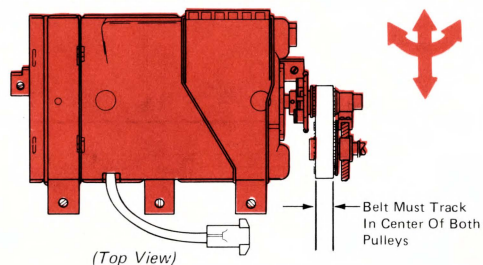
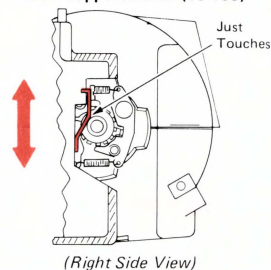
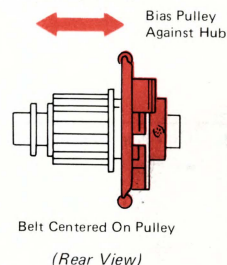
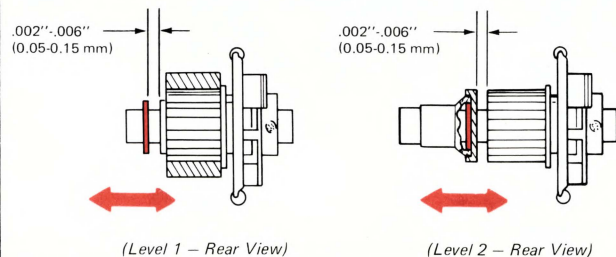
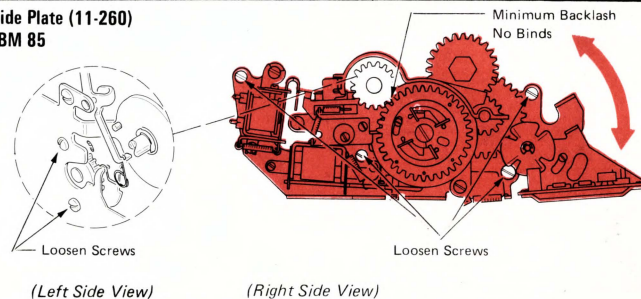
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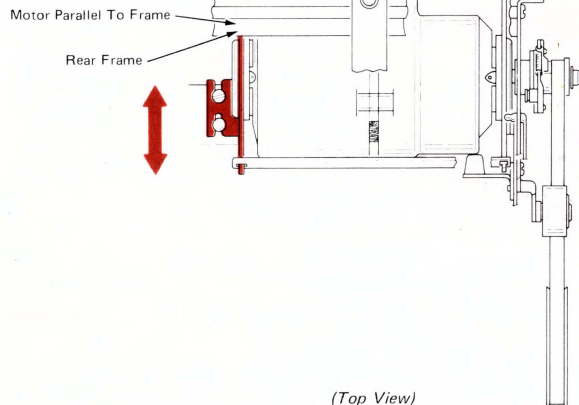
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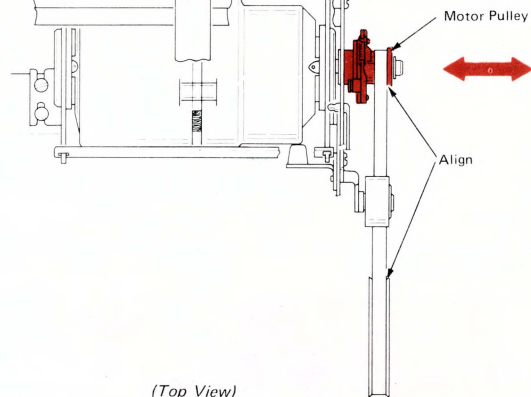
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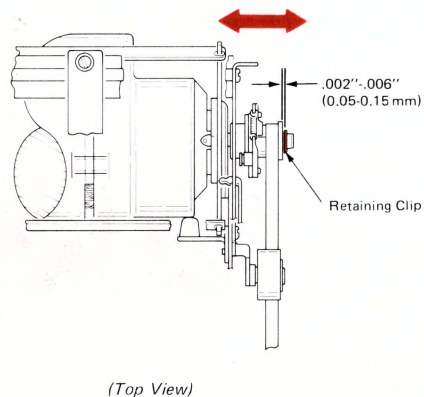
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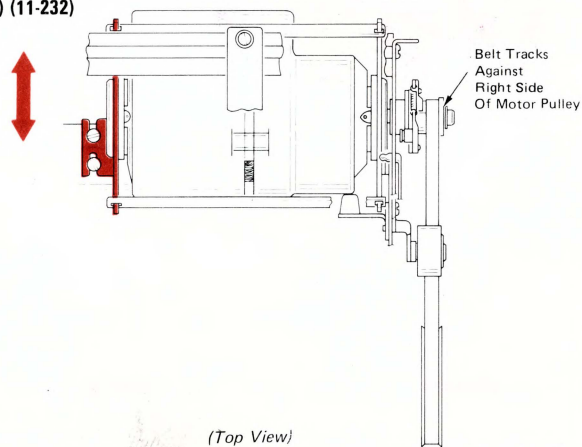
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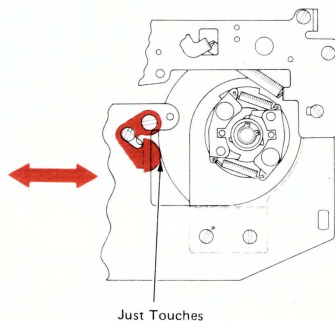


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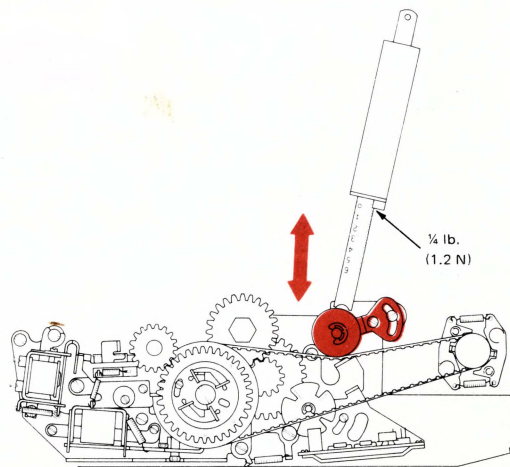


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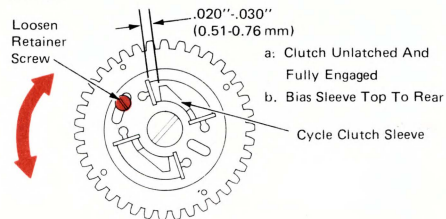
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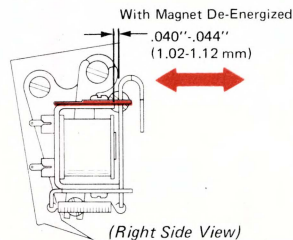
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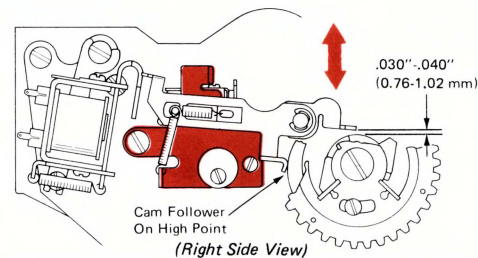
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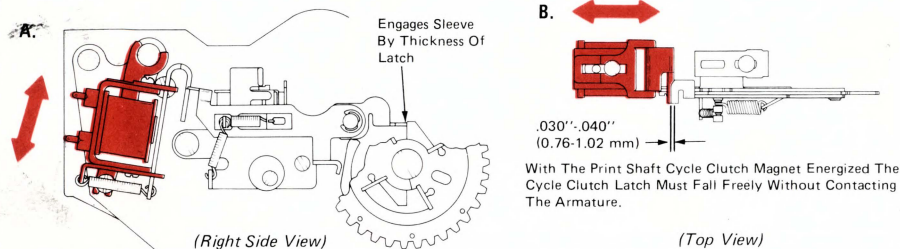
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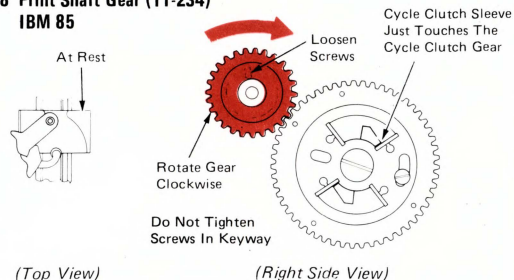


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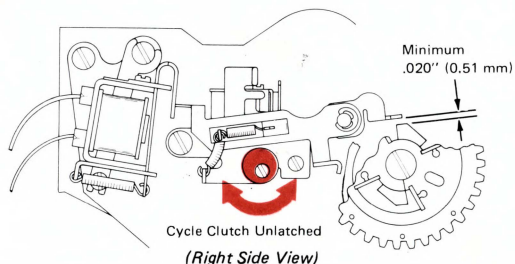


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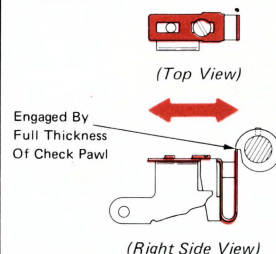


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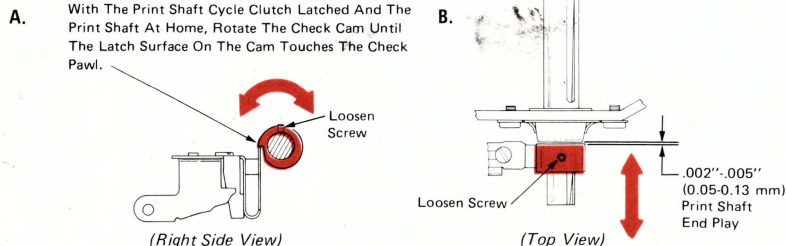
NOTE: The Cycle Clutch Latch Cam Follower Should Not Touch The Restoring Cam When The Cycle Clutch Latch Is Released.



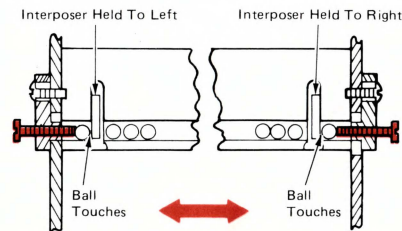
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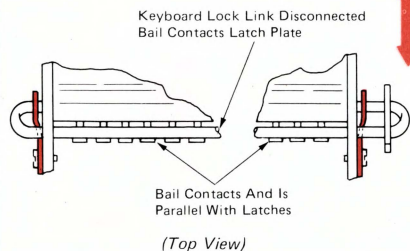
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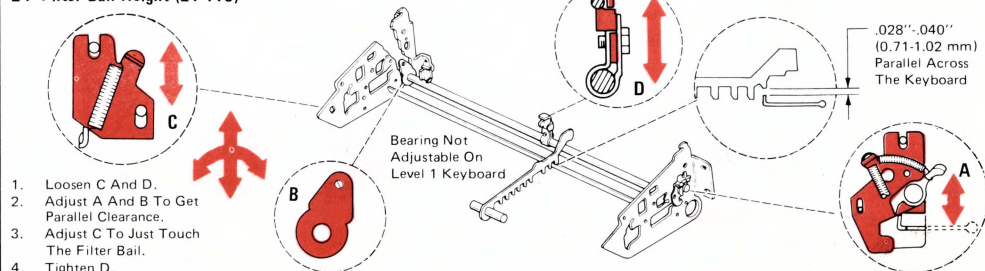
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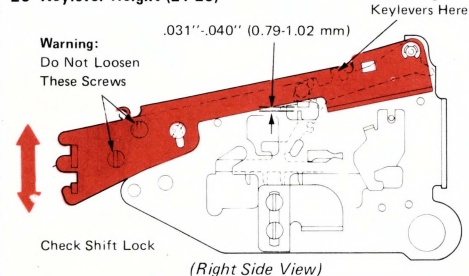
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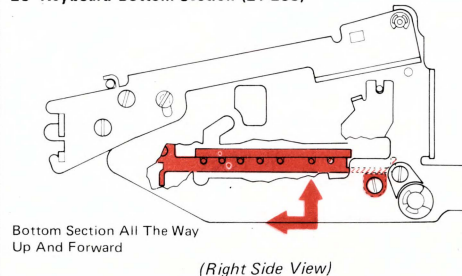
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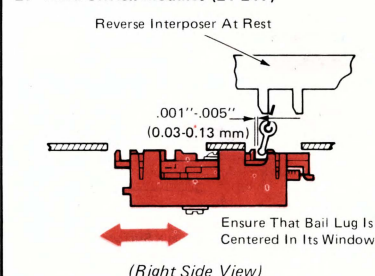
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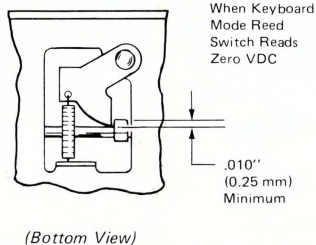
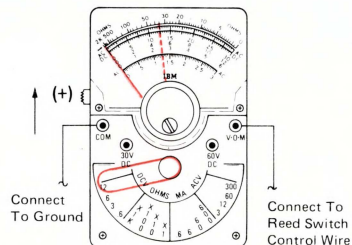
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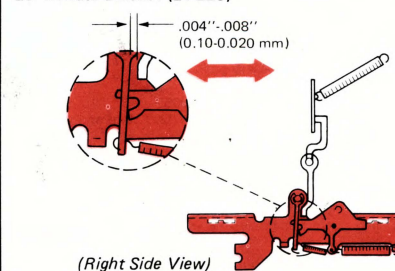
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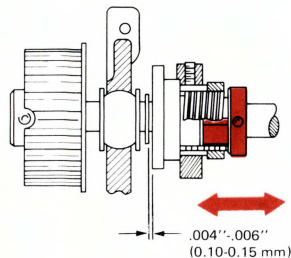
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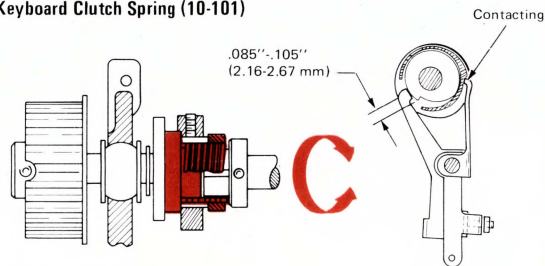
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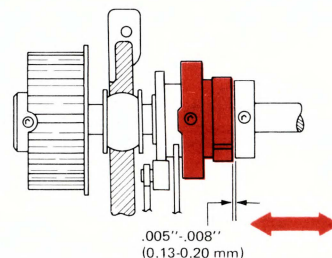
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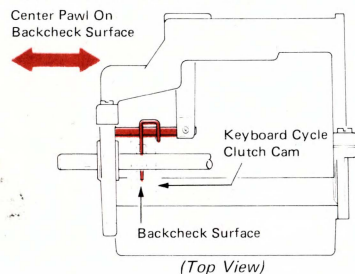
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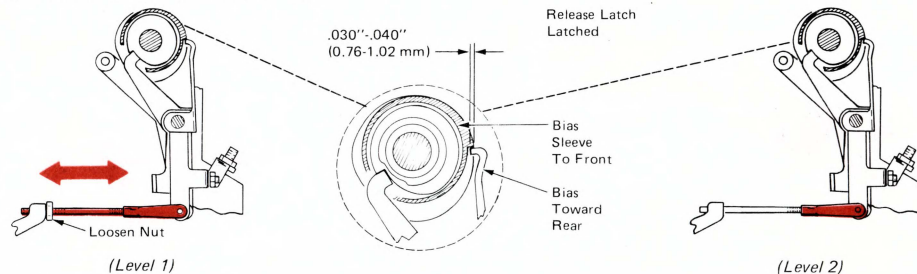
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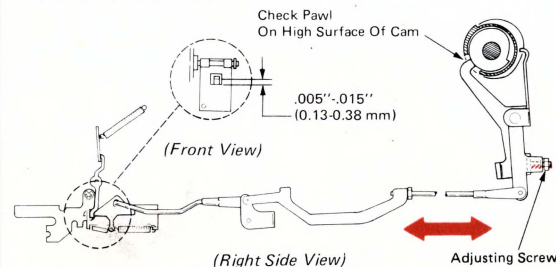
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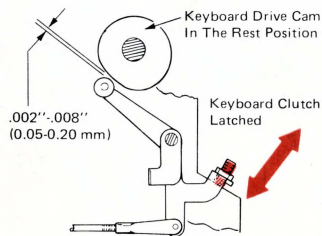
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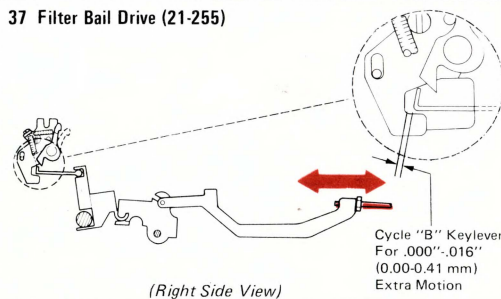
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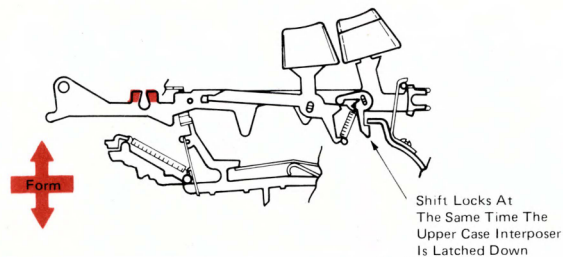
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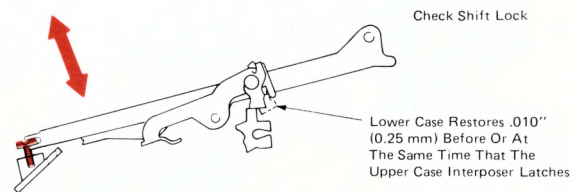
37 Filter Bail Drive (21-255)



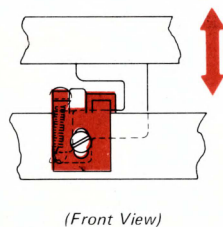
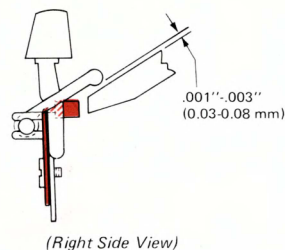
38 Upper Case Keylever (21-57)



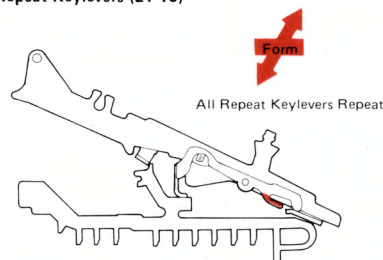
39 Lower Case Keylever (21-53)



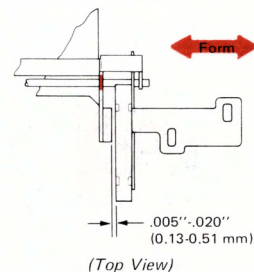
40 Space Bar Height (21-48)



41 Repeat Keylevers (21-15)



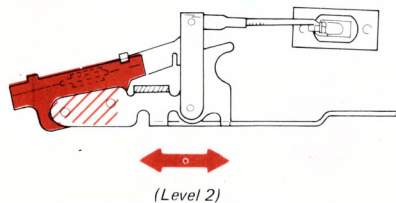
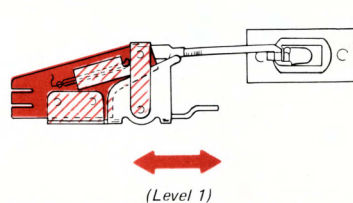
42 POR Switch Magnet Clearance (11-23/101)



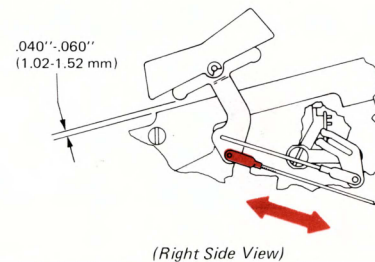
43 POR Reed Switch (11-28)

(11-103)

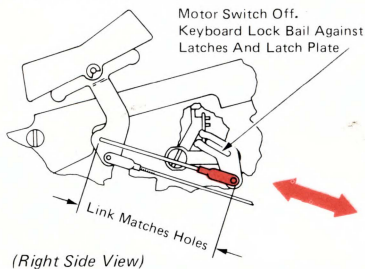
Reed Switch Opens After Motor Switch Closes



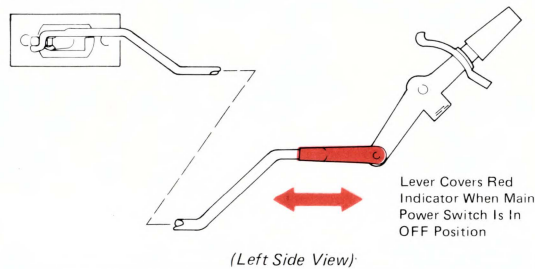
44 Motor On/Off Lever (11-31)



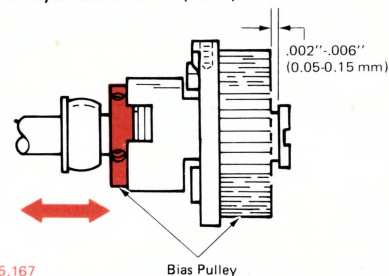
45 Keyboard Lock Link (21-125)



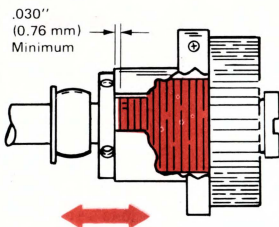
46 Power Lever (20-12)



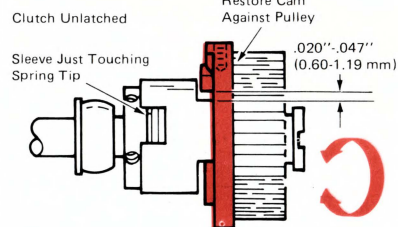
47 Cycle Clutch Arbor (10-60)



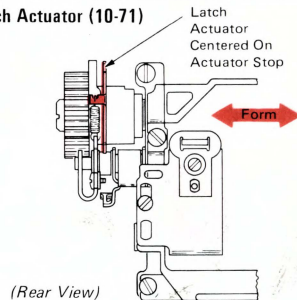
48 Print Shaft Cycle Clutch Spring (10-59)



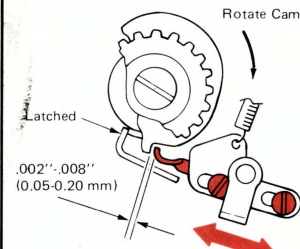
49 Restore Cam (10-54)



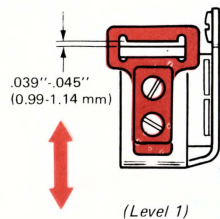
50 Latch Actuator (10-71)



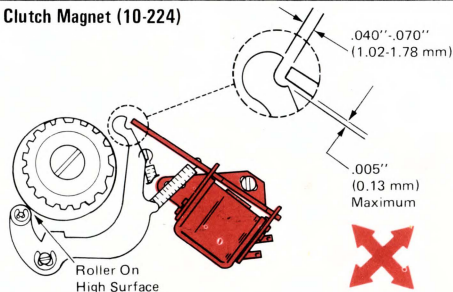
51 Check Pawl (10-43)



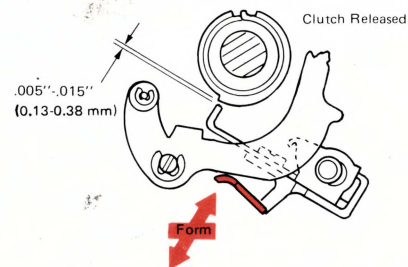
52 Cycle Clutch Magnet Upstop (10-37)



53 Cycle Clutch Magnet (10-224)

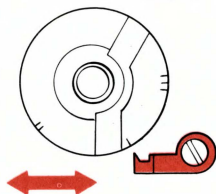
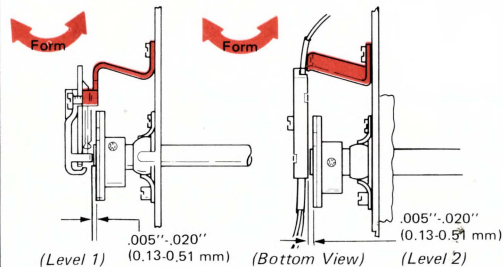
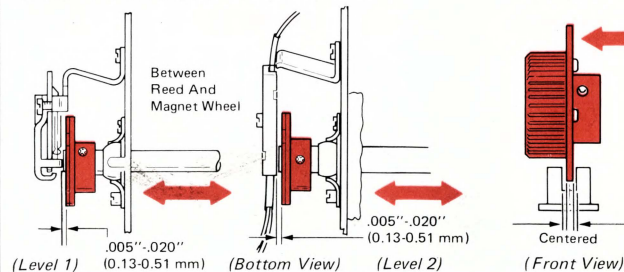
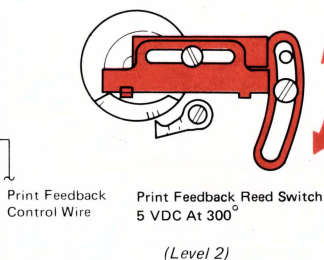
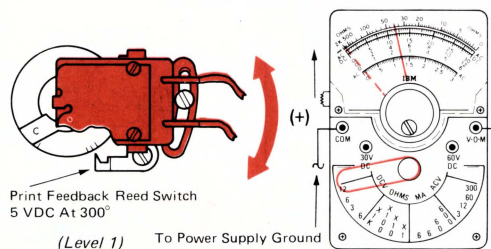
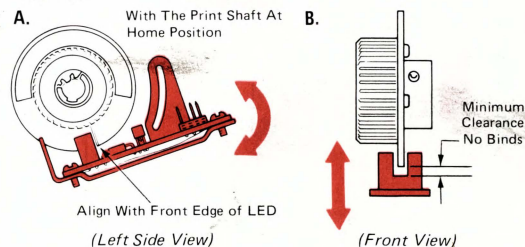
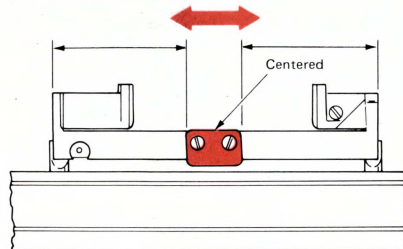
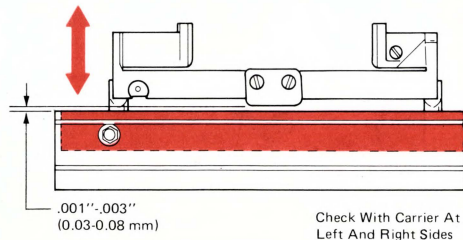
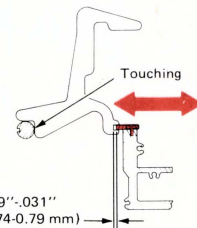


54 Cycle Clutch Latch Extension (10-145)

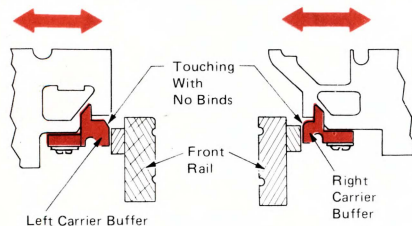


55 Print Feedback Pointer (02-52)

Print Shaft In Rest Position

**56 Print Feedback Bracket (02-054, 126)****57 Print Feedback Magnet Wheel (02-61) (02-601)****58 Print Feedback Timing (02-54) (02-126)****59 Print Feedback Timing (02-607) IBM 85****60 Front Carrier Shoe (02-66)****61 Front Rail Support (08-17)****62 Rear Rail (08-5)**

63 Carrier Buffers (02-30)

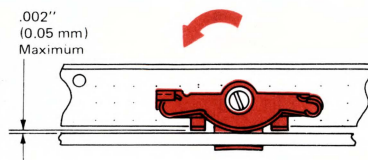


(Left Side View)

(Right Side View)

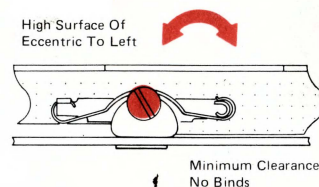
64 Rear Carrier Shoe (02-103)

(02-107)



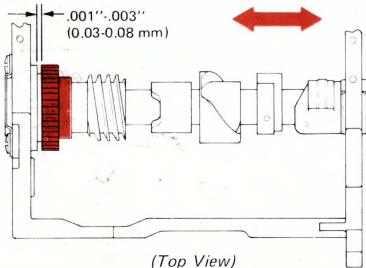
99,142,201

(Level 1 - Rear View)



(Level 2 - Rear View)

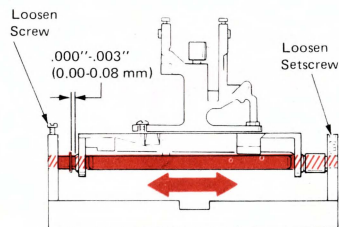
65 Print Sleeve End Play (02-2)



82

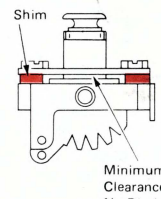
(Top View)

66 Rocker End Play (02-272)

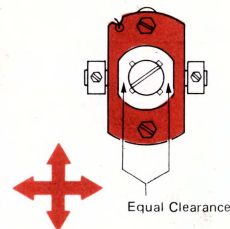


(Rear View)

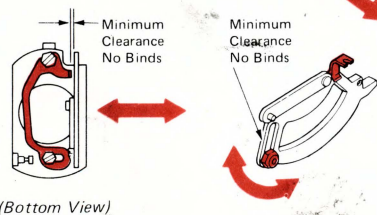
67 Upper Ball Socket (02-254)



68 Tilt Ring Spacer (02-251)

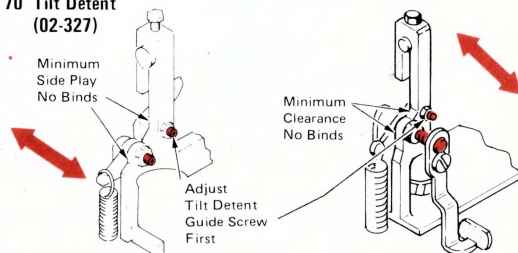


69 Rotate Detent (02-330)



(Bottom View)

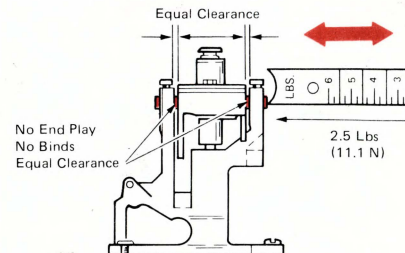
70 Tilt Detent (02-327)



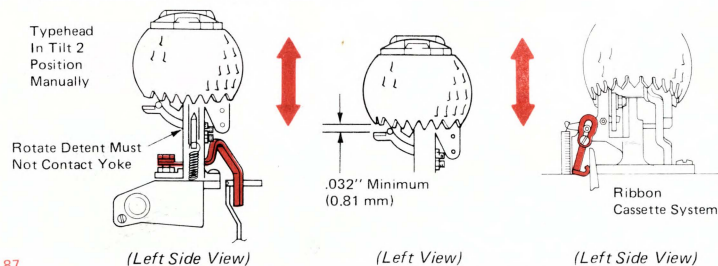
(Level 1 - Left Front View)

(Level 2 - Left Front View)

71 Tilt Ring Pivot Pins (02-278)

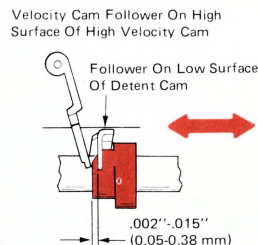


72 Typehead Skirt Clearance (02-319) (02-453)



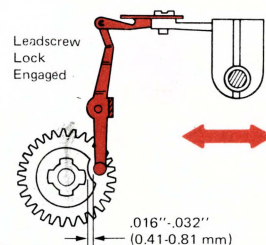
82,87

73 Detent Cam (02-8)



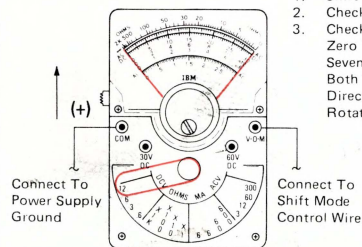
72

74 Leadscrew Lock (02-112)



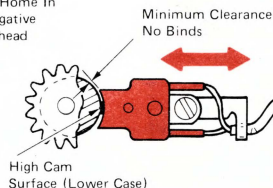
190

75 Shift Mode Switch (02-309)

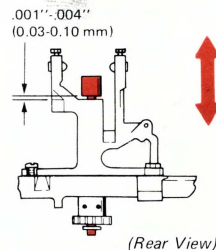


ADJUSTMENT CHECK (Check Timing Marks First)

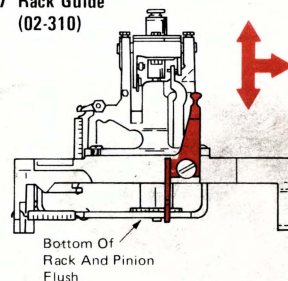
1. Shift To Lower Case.
2. Check Timing Marks.
3. Check That Switch Becomes Zero VDC Between Sixth And Seventh Tooth From Home In Both Positive And Negative Directions With Typehead Rotated By Hand.



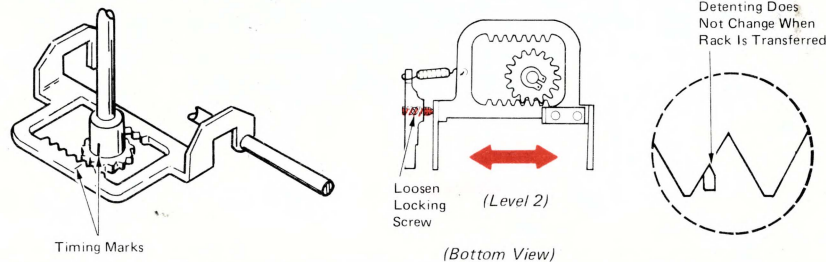
76 Rotate Shaft End Play (02-306)



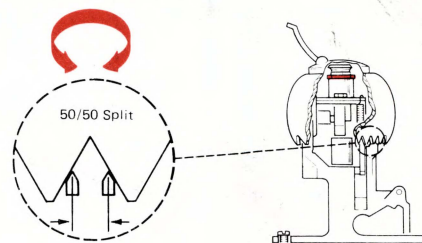
77 Rack Guide (02-310)

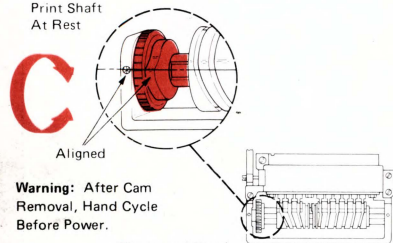


78 Rotate Rack Plate Home Position (02-308)



79 Typehead Homing (02-253)

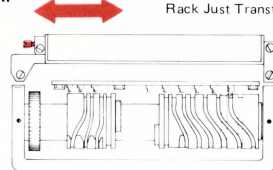


80 Selection Cam Preliminary (03-19)Print Shaft
At Rest

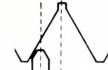
65.92 (Bottom View)

81 Pin Block (03-42)

A.

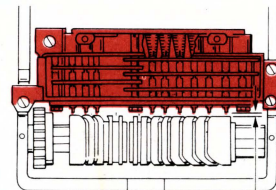


(Bottom View)

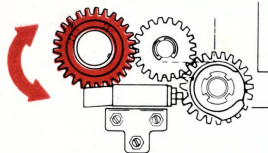
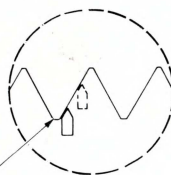
Half Cycle
Shift Operation Until
Rack Just Transfers.Adjust The Pin Block
For 25%-75% Split25% Head Play Removed
In The Clockwise Direction75% Head Play Removed
In Counterclockwise Direction

(Rear View)

B.

Selection Cams
Off High Point
(.006"-.009"
(0.15-0.23 mm))

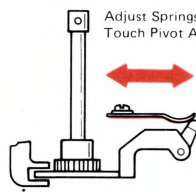
(Bottom View)

82 Selection Cams, Fine Timing (02-2)Check Skirt
Clearance FirstWithdrawal
Tilt 2-6 Rotate Character

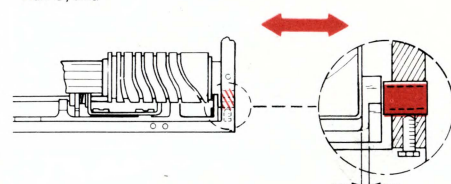
Just Drags

(Rear View)

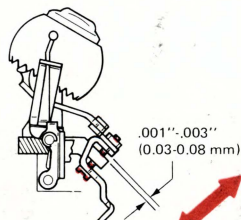
65.92

83 Rack Transfer Detent Springs (02-288)Adjust Springs To
Touch Pivot ArmsRack In
Rear Position Play Removed
To Rear

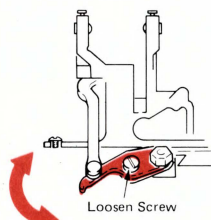
(Right Side View)

84 Bail Shaft Bushing (03-9)Rotate 5 Character
Half Cycled

(Bottom View)

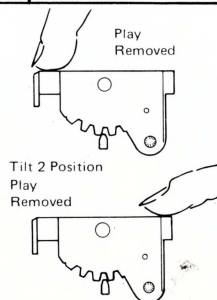
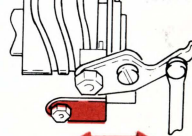
.010"-.015"
(0.25-0.38 mm)**85 Tilt Bellcrank (02-315)**.001"-.003"
(0.03-0.08 mm)

(Right Side View)

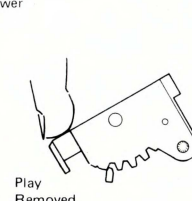
86 Tilt Ring Position (02-280)

(Rear View)

Loosen Screw

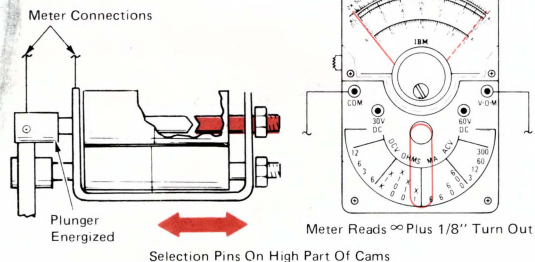
Tilt 2 Position
Play
Removed**87 Tilt Bellcrank Stop (02-316)**Clearance
Negative Rack
Transfer
Cam FollowerHalf Cycle
Character With Zero
Tilt But NOT Home Rotate

(Top View)

Play
RemovedPlay
Removed

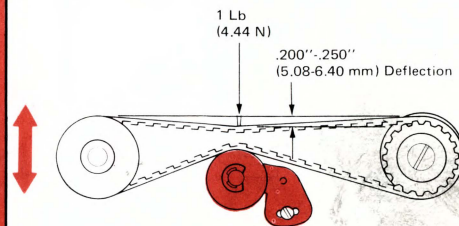
96

88 Selection Solenoid Airgap (03-30)

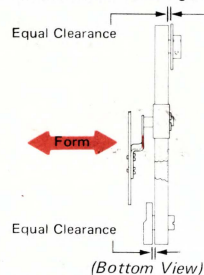
CHARACTERS USING ONE SOLENOID
(U.S. Machines)

Character	Solenoid
2	R1
/	R2
z	R3
p	T1
r	T2

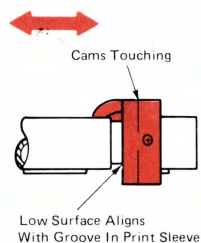
89 Print Shaft Belt (02-33)



90 Print Shaft Belt Tracking (02-33)

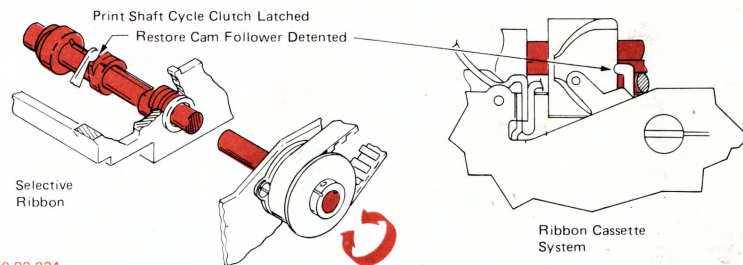


91 Velocity Cams (02-10)



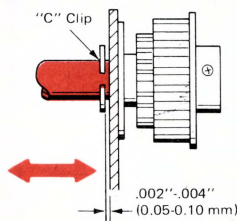
72,82,108

92 Print Shaft Timing (02-27)

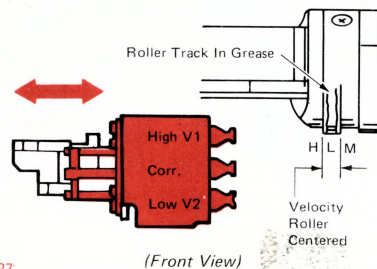


58,80,82,224

93 Print Shaft End Play (02-27)

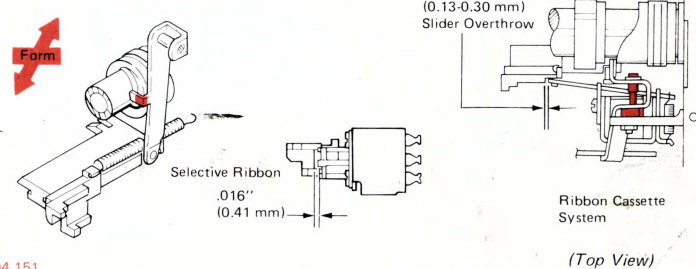


94 Velocity Magnet Assembly (02-79) (02-416)



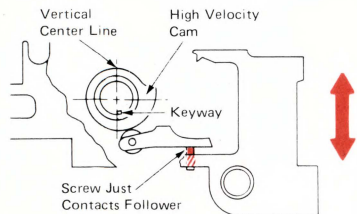
127

95 Velocity Slider Restore (02-23) (02-408)



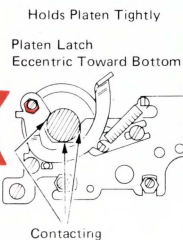
94,151

96 Velocity Cam Follower (02-28)

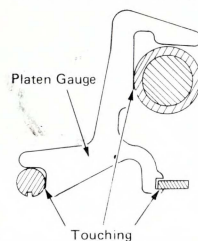


85

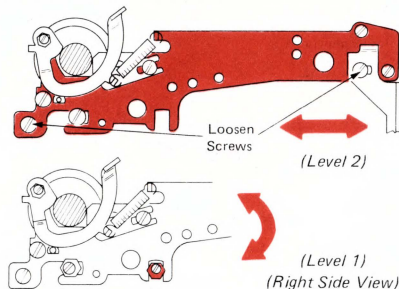
97 Platen Latches (22-43)



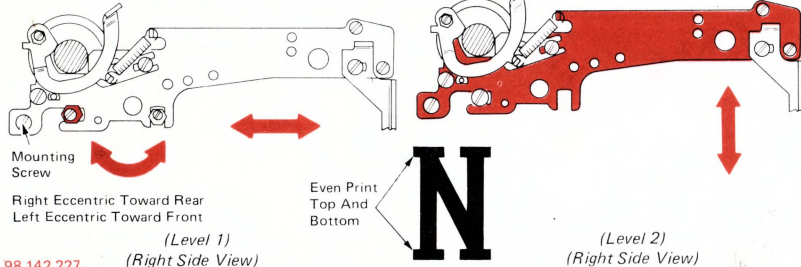
98 Platen Position Front To Rear (22-80) (22-250) (22-311)



143



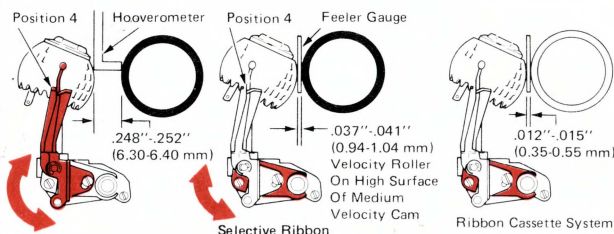
99 Platen Height (22-80) (22-250) (22-311)



98,142,227

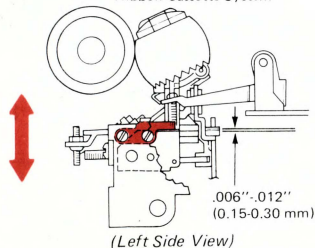
100 Powered Flight And Free Flight (02-294) (First Check Platen Front To Rear — Frames 98 And 99)

Powered Flight And Free Flight Interact

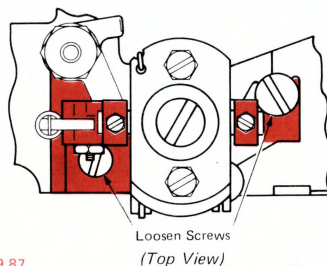


101 Rocker Up Stop (02-403)

Ribbon Cassette System



102 Yoke (02-275) (02-276)

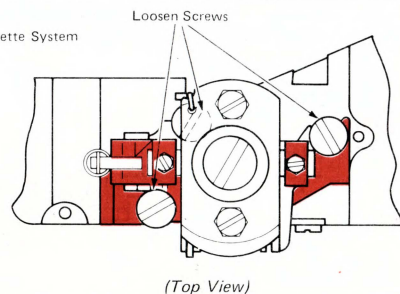


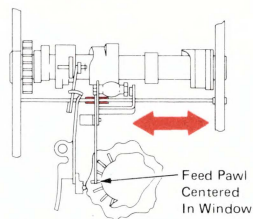
79,87

N

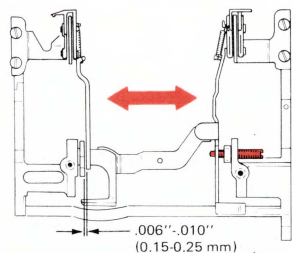
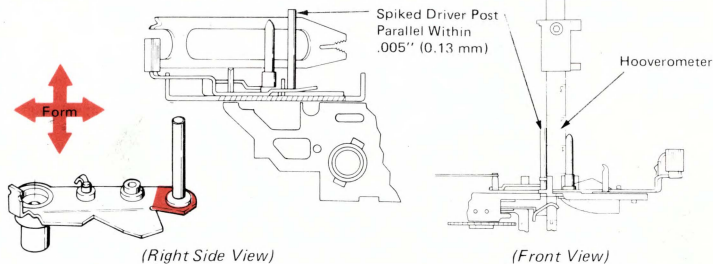
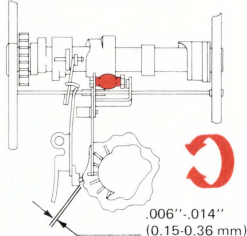
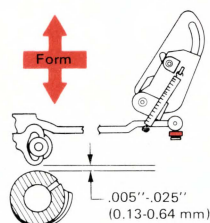
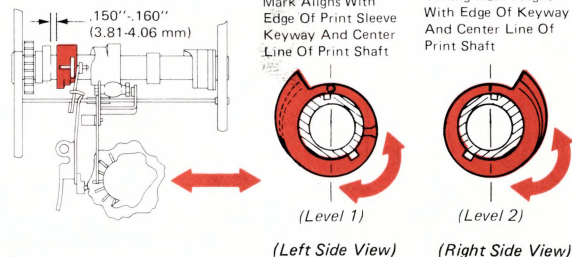
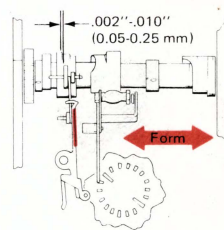
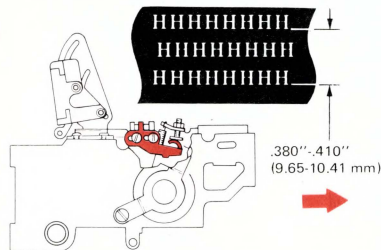
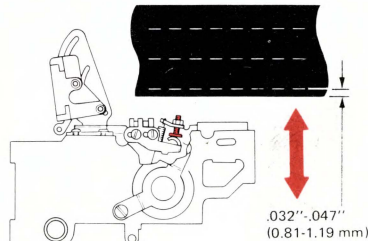
Adjust For Even Impression

Ribbon Cassette System

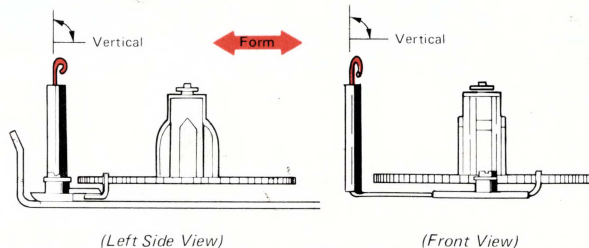


103 Ribbon Feed Cam Follower Bracket (15-202)

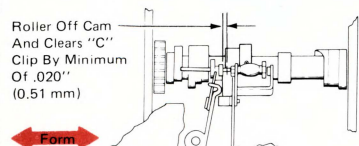
123, 124

104 Ribbon Lift Arm (15-195)**105 Spiked Driver Post (15-87)****106 Ribbon Feed Cam Follower Eccentric (15-198)****107 Ribbon Lift Lower Stop (15-188)****108 Ribbon Lift Cam (15-162)****109 Ribbon Lift Control (15-40)****110 Ribbon Spread Adjusting Plate (15-209)****111 Ribbon Height (15-197)**

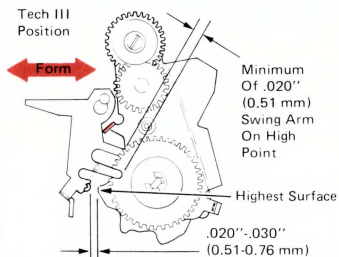
110

112 Ribbon Shock Wire (15-68)

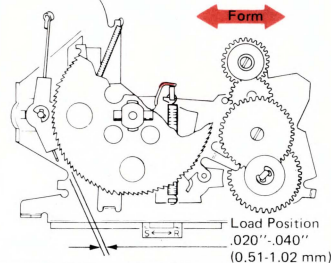
113 Stencil Adjustment (15-40)



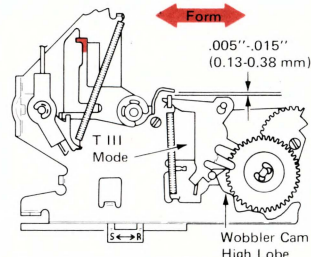
114 Swing Arm Lug (15-87)



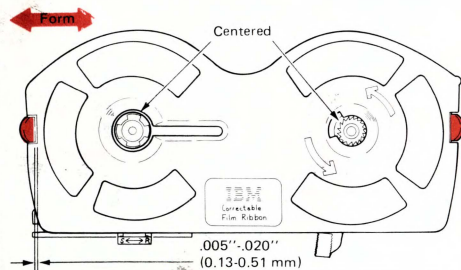
115 Shock Wire Disengage Lever (15-89)



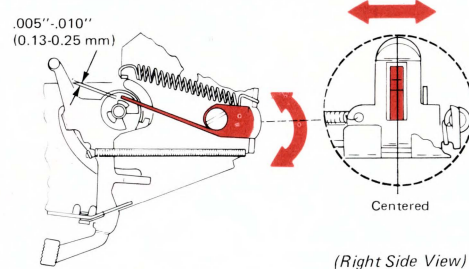
116 Shock Wire Disengage Lever (15-89)



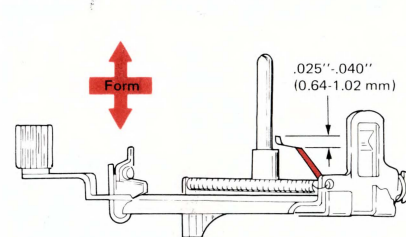
117 Cartridge Guides (15-230)



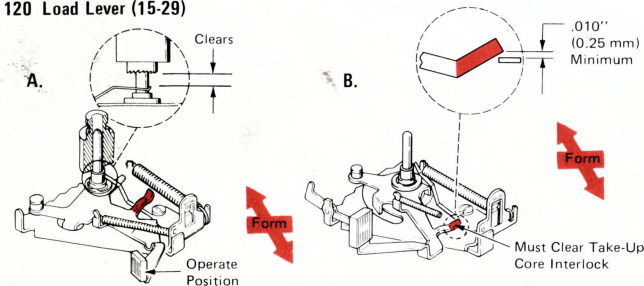
118 Cartridge Retaining Springs (15-11)



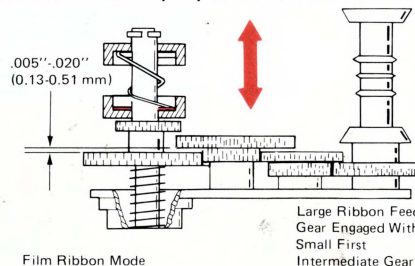
119 Take-Up Core Interlock (15-11)



120 Load Lever (15-29)

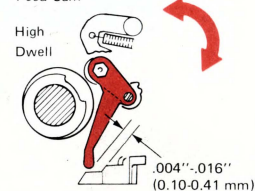


121 Mode Button Grip Clip Position (15-75)

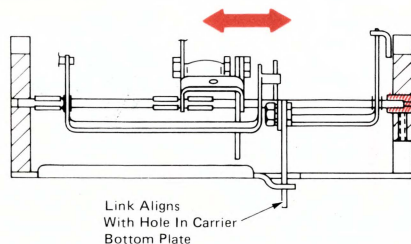


122 Ribbon Feed Pawl Interlock (15-201)

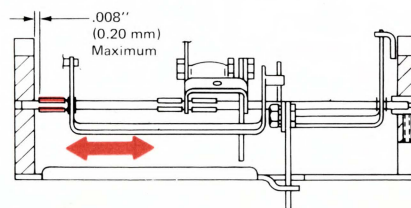
Ribbon Feed Cam Follower On High Surface Of Ribbon Feed Cam



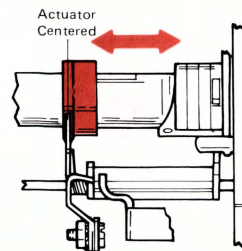
123 Correcting Control Shaft (15-152)



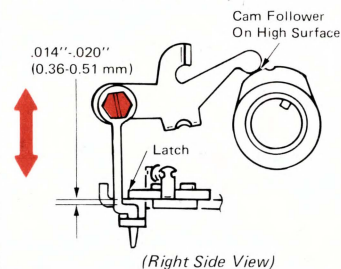
124 Correcting Control Shaft End Clearance (15-163)



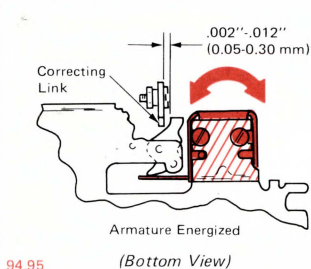
125 Correcting Restore Cam (02-9)



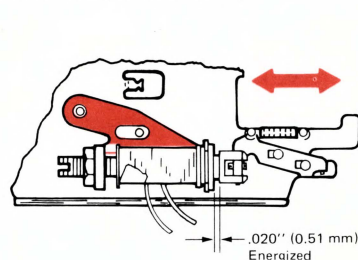
126 Correcting Link (15-165)



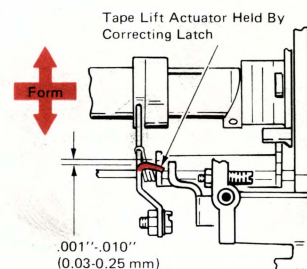
127 Selective Correcting Latch (02-79)



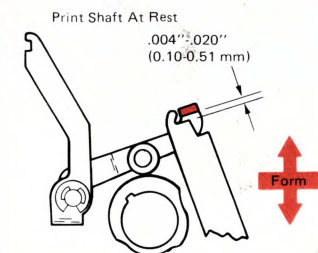
128 Correcting Solenoid (02-62)



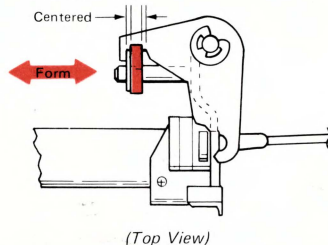
129 Tape Feed Latch (15-171)



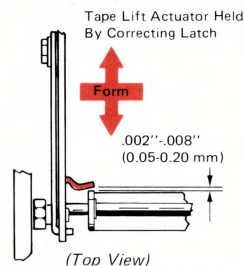
130 Tape Feed Cam Follower (15-149)



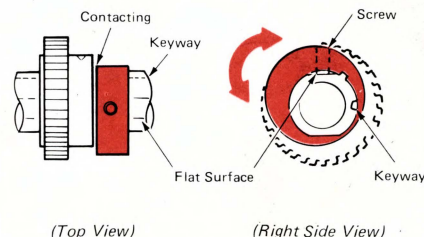
131 Tape Feed Cam Follower Vertical Arm (15-149)



132 Tape Lift Arm Lug (15-175)

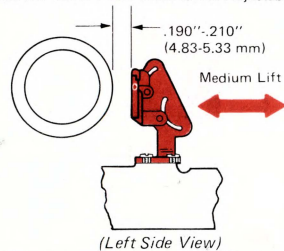


133 Tape Lift Cam (02-4)

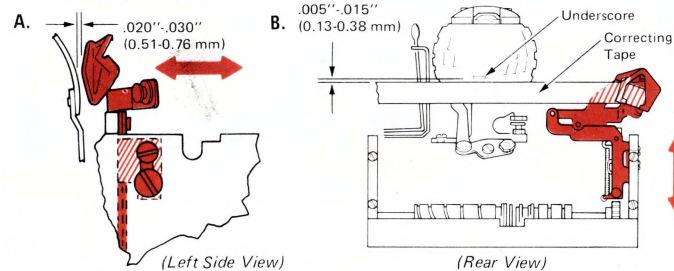


134 Left Ribbon Lift Guide (15-188)

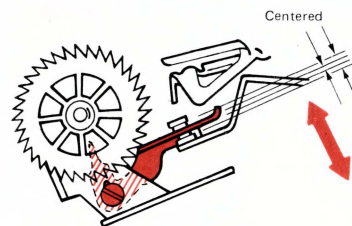
NOTE: Level 1 Lift Guide Is Not Adjustable.



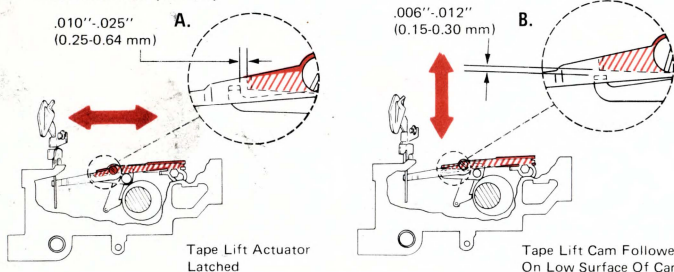
135 Tape Lift Assembly (15-139)



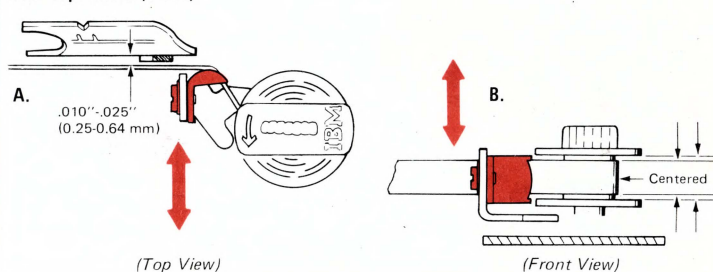
136 Tape Supply Cradle Fork (15-93)



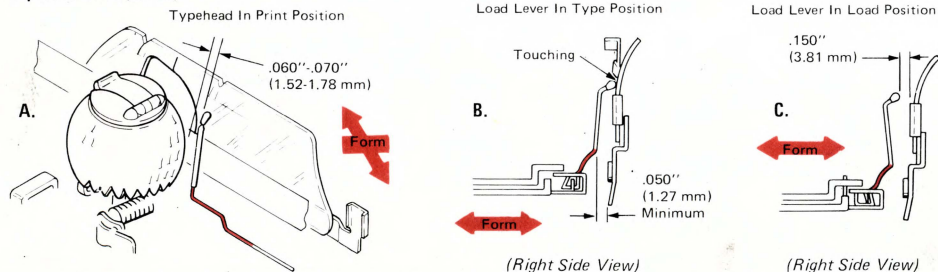
137 Lift Arm Latch (15-180)



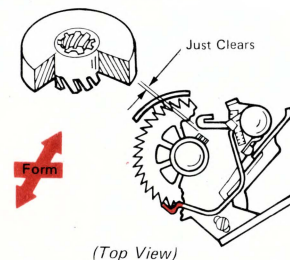
138 Tape Guide (15-24)

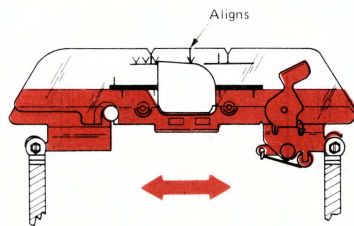
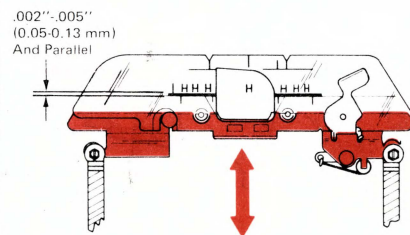
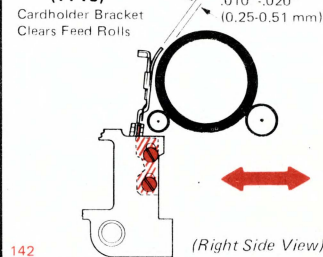
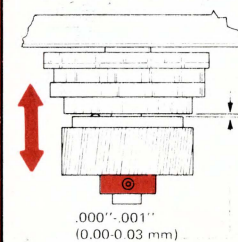
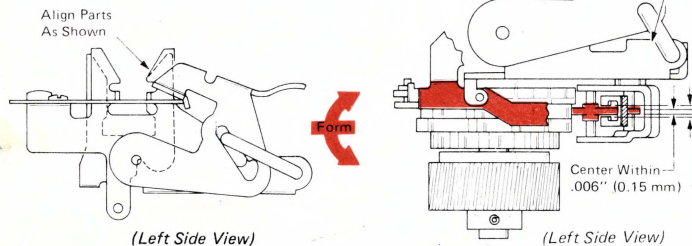
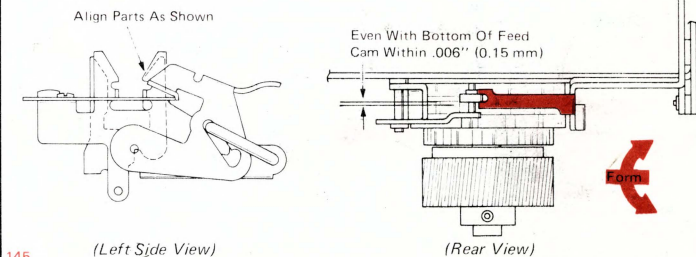
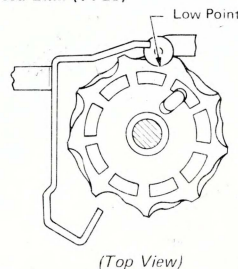


139 Separator Wire (15-22)



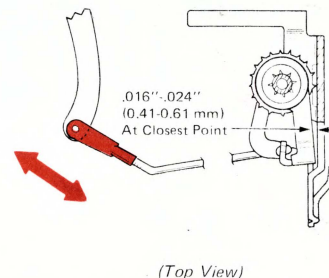
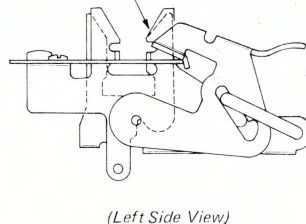
140 High Bias Spring (15-55)



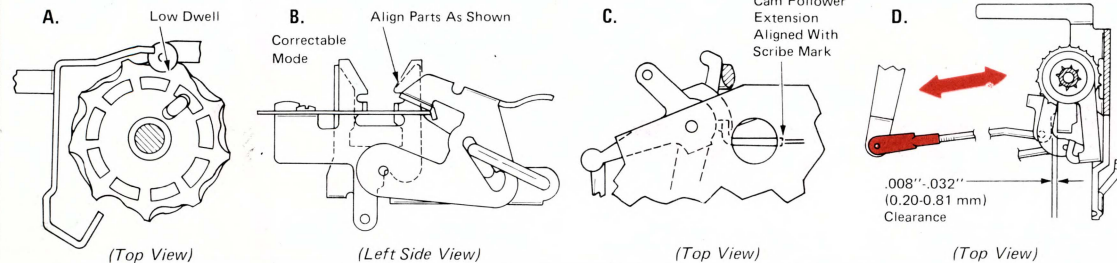
141 Cardholder Left-To-Right (15-131) (14-72)**142 Cardholder Height (15-125, 137) (14-72)****143 Cardholder Clearance (15-125, 137) (14-73)****144 Ribbon Driven Gear End Clearance (14-19)****145 Ribbon Lift Cam Follower (14-1)****146 Ribbon Feed Cam Follower (14-1)****147 Ribbon Feed Link (14-29)**

Correctable
Mode

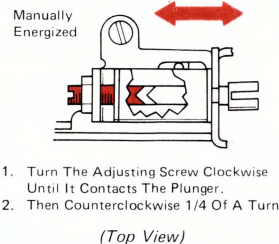
Align Parts As Shown



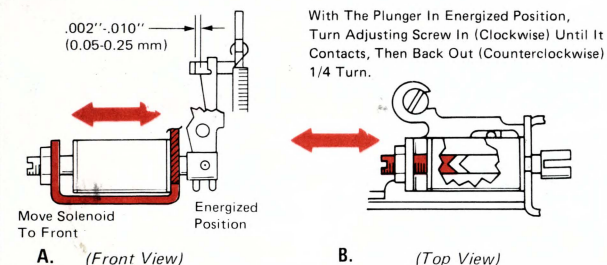
148 Tape Feed Link (14-31)



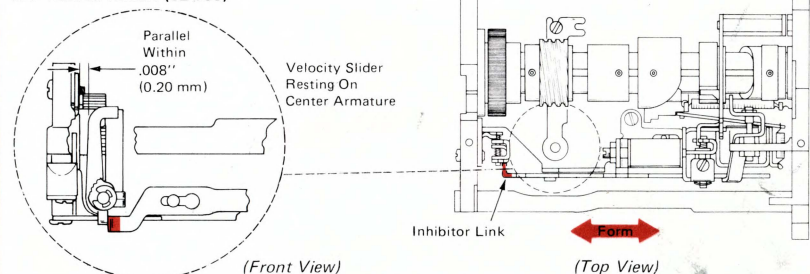
149 Correcting Solenoid Airgap (02-62)



150 Correcting Latch Assembly (02-489)

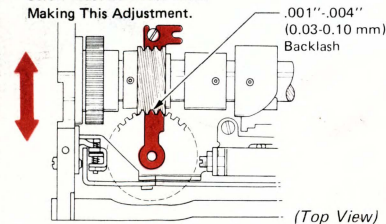


151 Ribbon Inhibit (02-508)

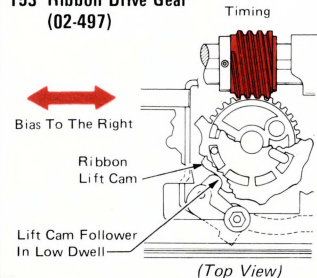


152 Cam Shaft Locator (02-413)

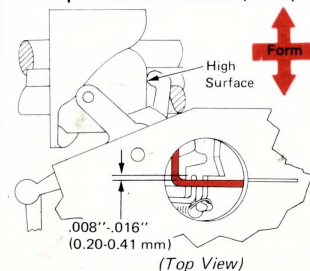
NOTE: LH Ribbon Plate Mounting Screw Must Be Loose When Making This Adjustment.



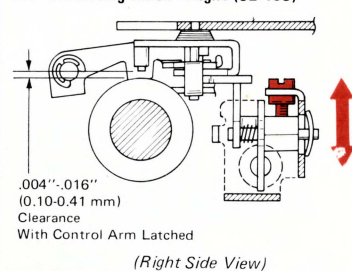
153 Ribbon Drive Gear (02-497)

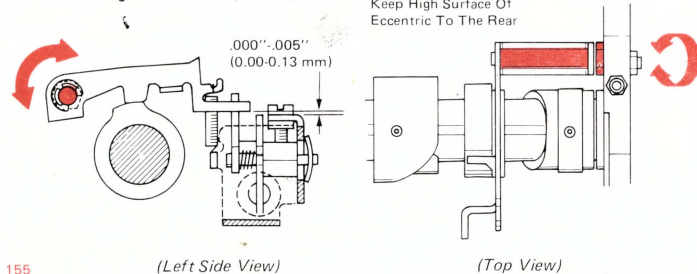
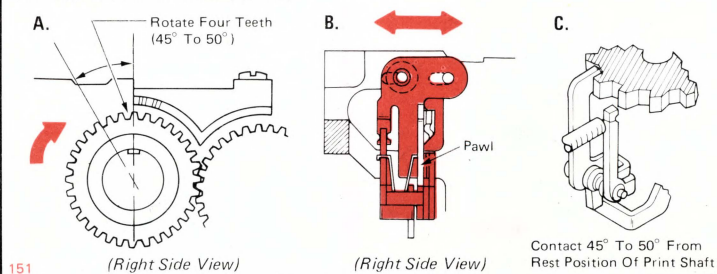
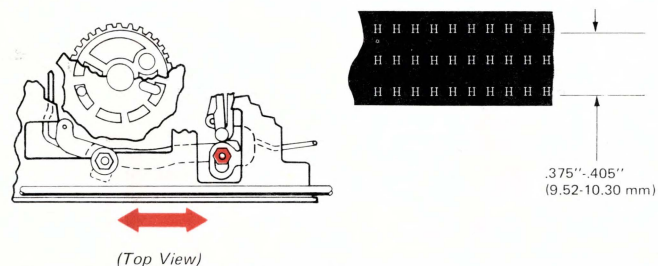
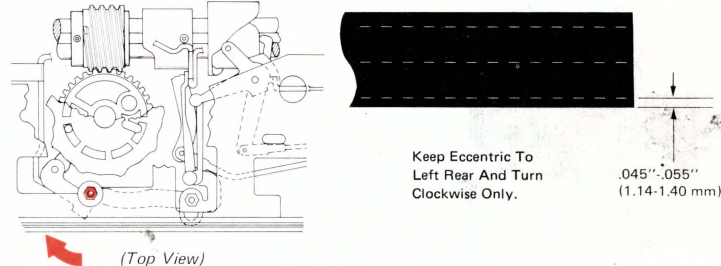
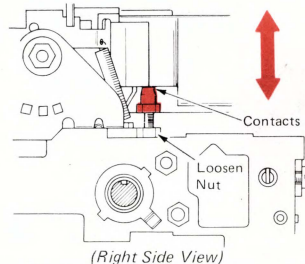
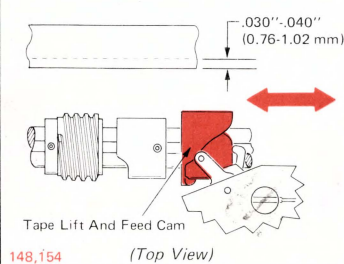
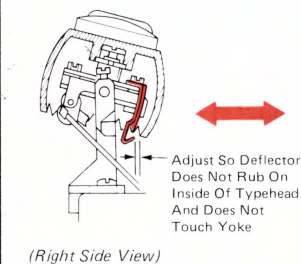
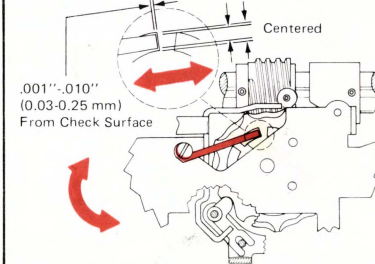


154 Tape Feed Cam Follower (14-32)

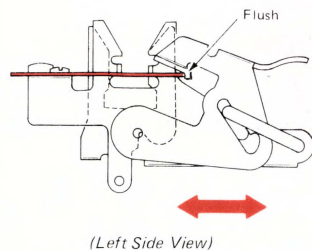


155 Correcting Latch Height (02-483)



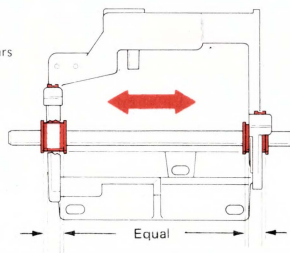
156 Correcting Control Arm (02-503)**157 Ribbon Drive Inhibitor (02-490)****158 Ribbon Spread (14-24)****159 Ribbon Lift (14-8)****160 Cassette Down Stop (02-504)****161 Tape Lift Feed Cam (02-498)****162 Correcting Tape Deflector (02-451)****163 Check Pawl (14-12)**

164 Load Lever Latch (14-4)

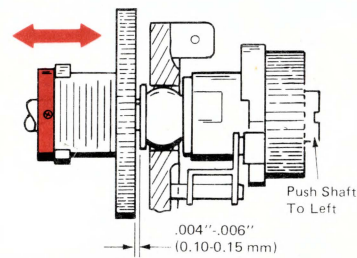


165 Power Module Bearings (10-64)

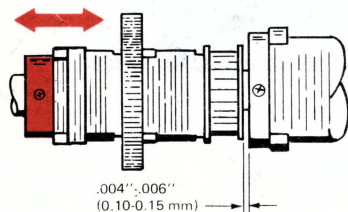
1. Loosen Six PM Screws
2. Insert Paper Between Upper & Lower Gears
3. Tap Frame Lightly In Area Of Bearing
4. Tighten PM Frame Screws
5. Remove Paper
6. Test For Bind



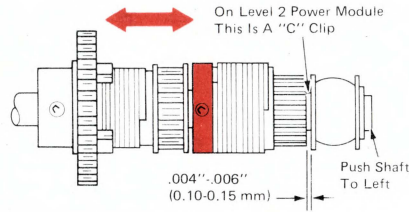
166 Upper Shaft (10-163)



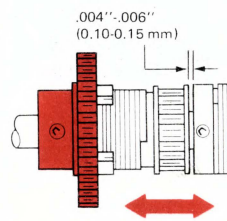
167 Drive Arbor (10-176)
(Upper Shaft)



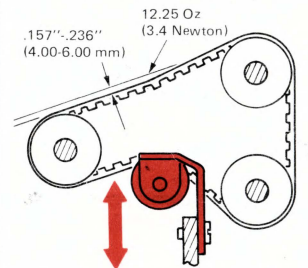
168 Lower Shaft (10-180)



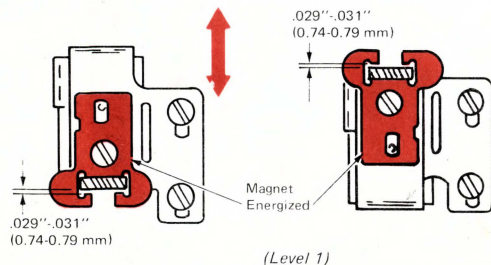
169 Forward Clutch (10-187)
(Lower Shaft)



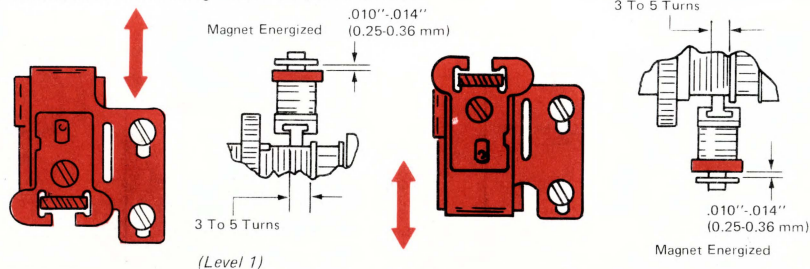
170 Leadscrew Belt Tension (10-73)

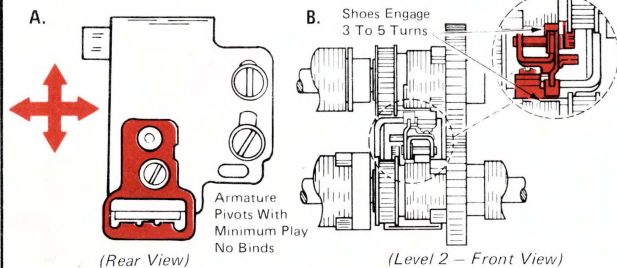
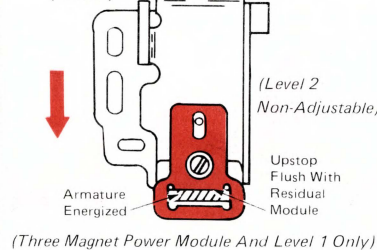
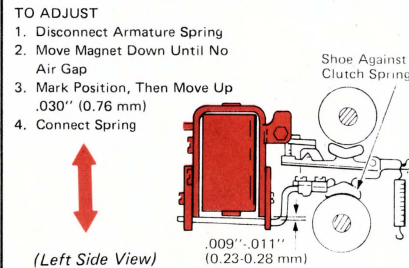
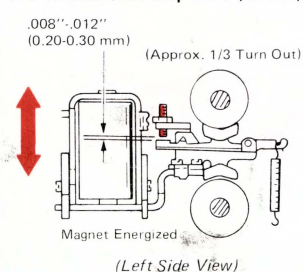
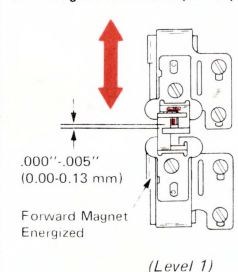
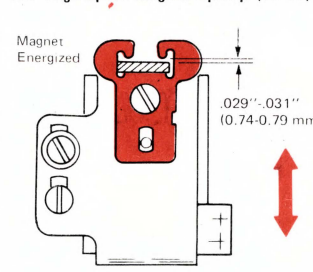
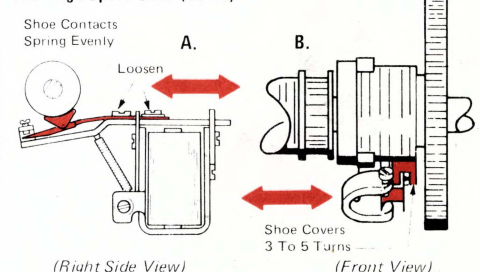
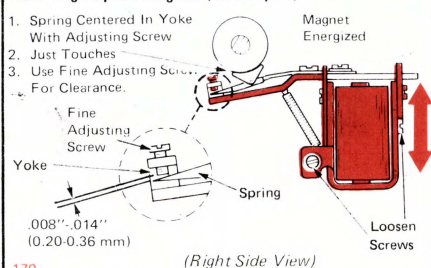
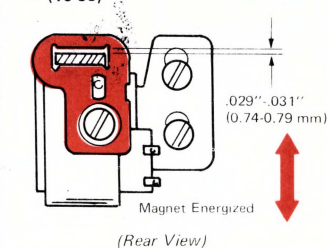
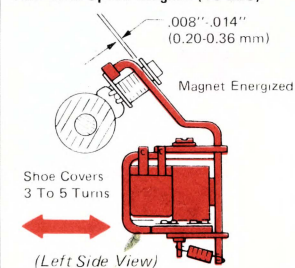
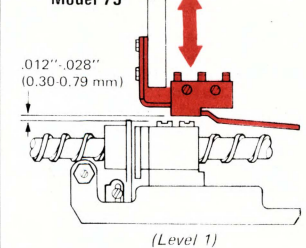


171 Reverse And Forward Magnet Upstop (10-9, 10-23)

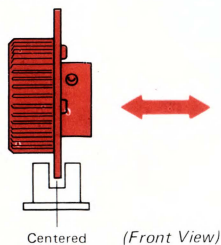


172 Reverse And Forward Magnet Position (10-220, 221)

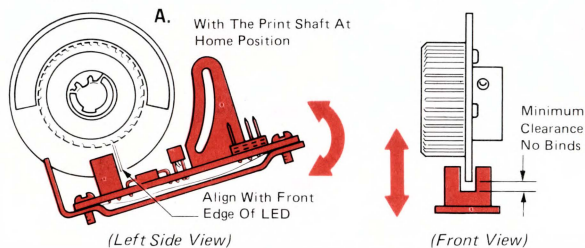


173 Directional Magnet Pivot Plate (10-228)**174 Directional Magnet Armature Upstop (10-196)****175 Directional Magnet (10-228)****176 Reverse Shoe Stop Lever (10-204)****177 Magnet Interlock (10-22)****178 High Speed Magnet Upstop (10-16)****179 High Speed Shoe (10-15)****180 High Speed Magnet (10-222, 11)****181 Low Speed Magnet Upstop (10-85)****182 Low Speed Magnet (10-223)****183 Carrier Decelerator Switch (10-230) Model 75**

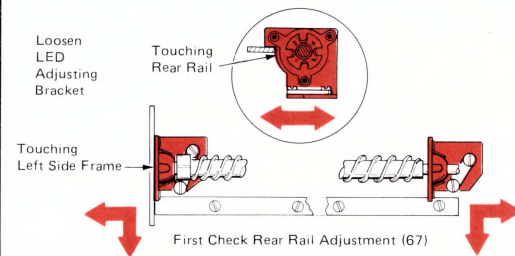
**184 Print Feedback Wheel (02-601)
IBM 85**



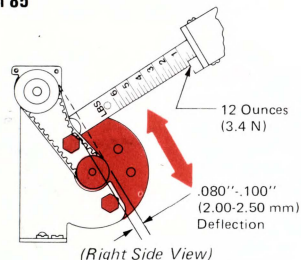
**185 Print Feedback Timing (02-607)
IBM 85**



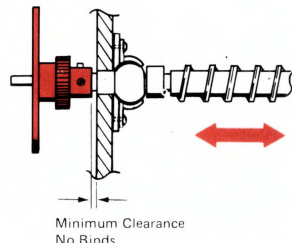
186 Leadscrew Bearings (06-21)



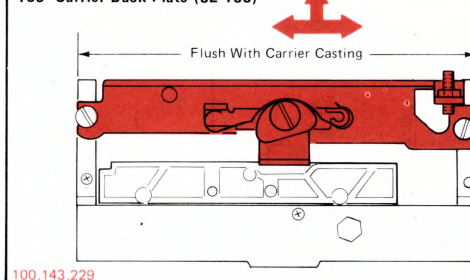
**187 Escapement Motor Belt Tension (06-201)
IBM 85**



188 Leadscrew End Clearance (06-42)

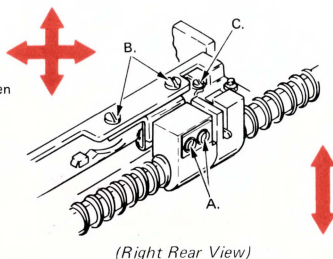


189 Carrier Back Plate (02-108)

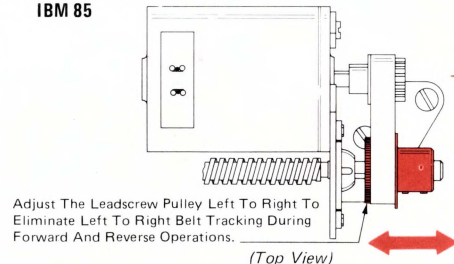


190 Leadscrew Nut (06-65)

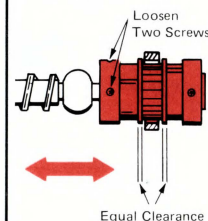
1. Loosen A, B & C
2. Tighten B Friction Tight
3. Push LS Lock Top To Rear
4. (w/o LS Nut Clip) Center A Left To Right And Tighten (w/LS Nut Clip) Push LS Nut Down; Pull LS Up Slightly And Tighten A
5. Loosen B; Center Left To Right And Tighten
6. Rotate Print Shaft Past 1/2 Cycle Until Lock Link Moves Forward .015\"-0.030\" (0.38-0.76 mm) And Tighten C



**191 Leadscrew Pulley (06-204)
IBM 85**

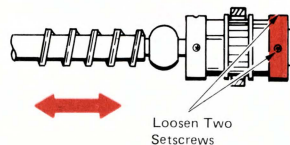
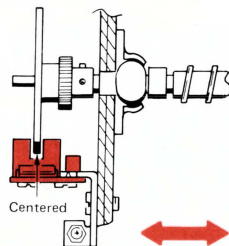
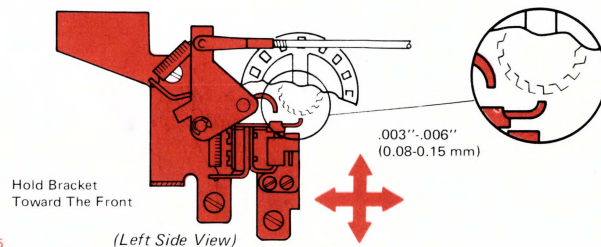


192 Leadscrew Pulley (06-22)

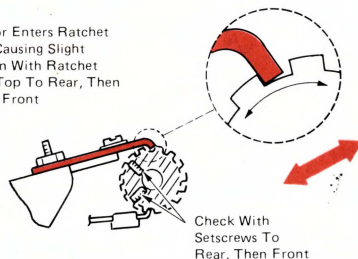
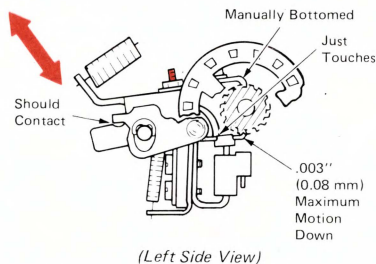
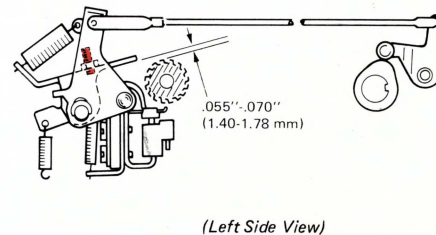
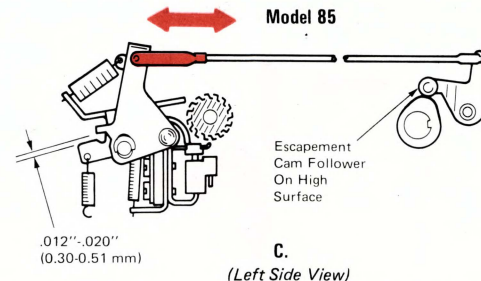
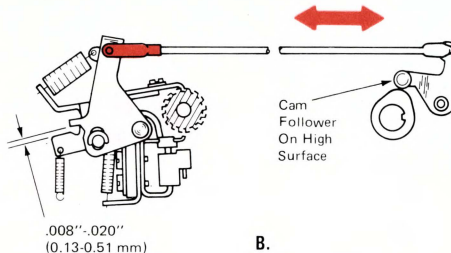
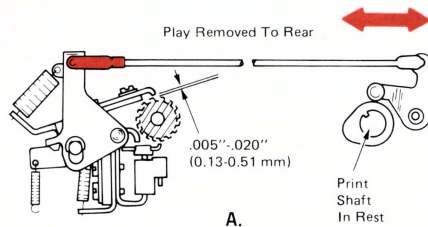


193 Torque Limiter (06-23)

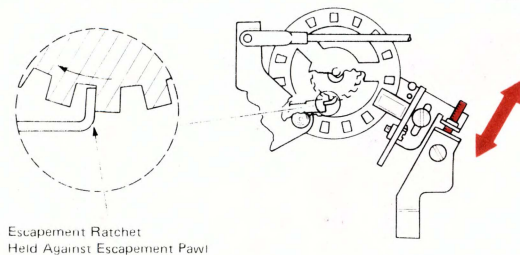
Adjust For Carrier Tension
Of 2.4 lb (8.9-17.8 N)
At Low Speed

**194 Emitter Board (06-34)****195 Escapement Pawl Clearance (06-70) (06-110) (06-210) 50/60/75/85****196 Escapement Inhibitor (06-51)**

Inhibitor Enters Ratchet
Notch Causing Slight
Rotation With Ratchet
Biased Top To Rear, Then
Top To Front

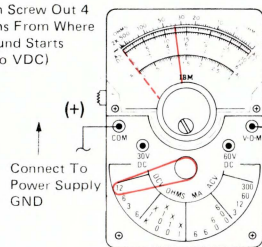
**197 Inhibitor Stop Screw (06-03) (06-207)****Model 85****198 Escapement Link (06-44) (06-109)**

199 Emitter Bracket (06-39)



Models 50/60/75

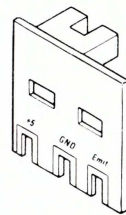
Turn Screw Out 4
Turns From Where
Ground Starts
(Zero VDC)



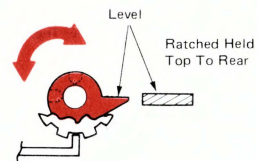
Model 85

Turn Screw Out
4 Turns From
Where Service
LED 1 Turns
"On"

Connect
To Emit
Control
Wire



200 Leadscrew Stop (06-66)

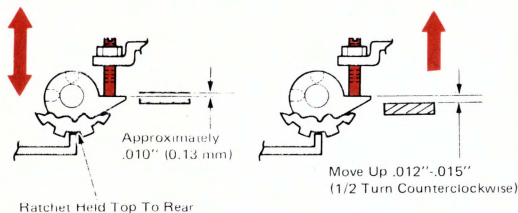


Carrier 1 To 2 Ratchet Teeth
From Left Side Frame

188

201 Leadscrew Home (02-101)

Model 85

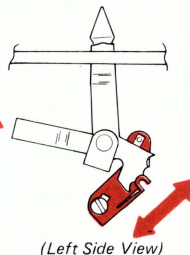
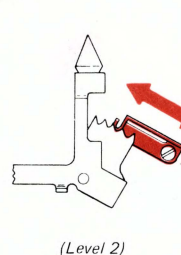
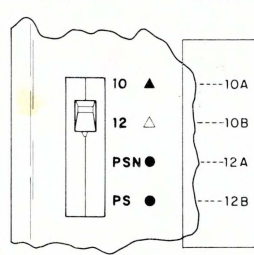
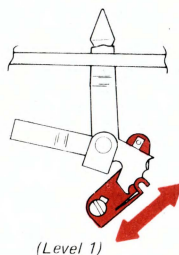
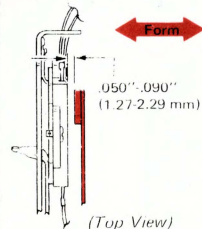


202 Pitch Detent (06-12)

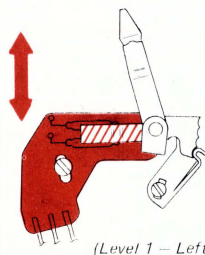
Models 50/85

Models 60/75

Model 85

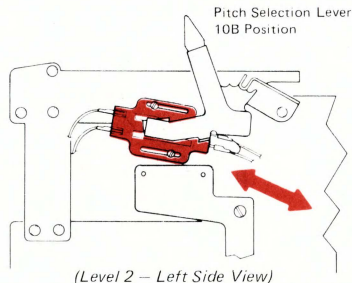

203 Pitch Selection
Magnet (06-8) (06-100)


204 Pitch Selection Switches (06-10) (06-102)



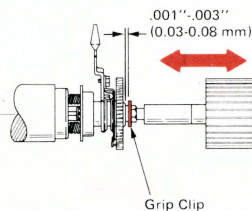
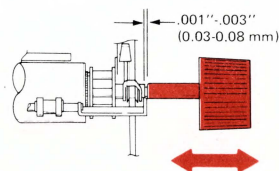
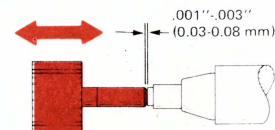
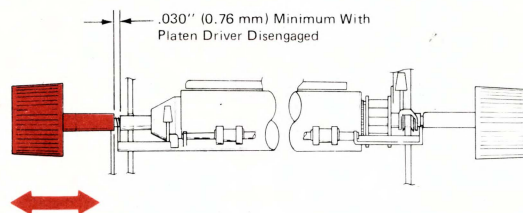
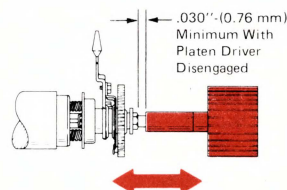
50	60	75	P1	P2
10	10A	10A	CLOSED	OPEN
12	10B	10B	CLOSED	CLOSED
PS	12A	12A	OPEN	CLOSED
PSN	12B	12B	OPEN	OPEN

Pitch Selection Lever
Model 50 - 12
Model 60 - 10B
Model 75 - 12
P2 Upper Switch
P1 Lower Switch



Model 85

	Bottom P1	Top P2
PS	Open, +5 VDC	Open, +5 VDC
PSN	Open, +5 VDC	Closed, 0 VDC
12P	Closed, 0 VDC	Closed, 0 VDC
10P	Closed, 0 VDC	Open, +5 VDC

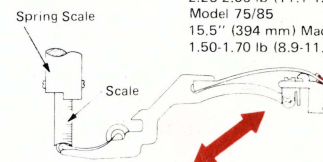
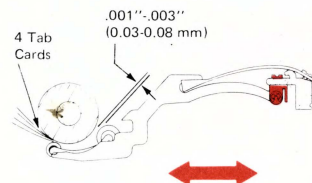
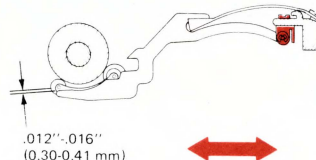
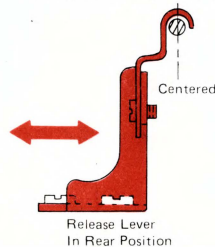
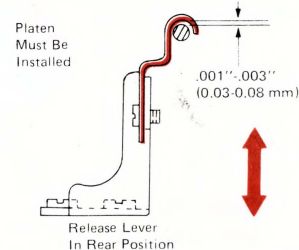
205 Ratchet End Clearance (22-308)
IBM 85

206 Platen End Clearance (22-2) (22-301)

207 Left Platen Knob (22-301)
IBM 85

208 Platen Variable (22-2) (22-301)

Model 85

209 Feed Roll Tension (22-18)

Release Lever
In Rear Position

Model 50/60:
15.5" (394 mm) Machine:
2.00-2.25 lb (8.9-11.1 N)

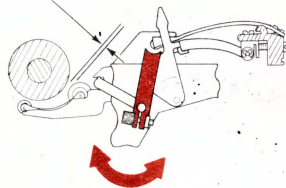
All Models:
19.1" (485 mm) Machines:
2.25-2.50 lb (11.1-12.2 N)

Model 75/85
15.5" (394 mm) Machine:
1.50-1.70 lb (8.9-11.1 N)


210 Feed Rolls Front-To-Rear (22-24)
Model 50/60

Model 75/85

211 Center Support
Front-To-Rear (22-30) (22-337)

212 Center Support Extension (22-26) (22-336)


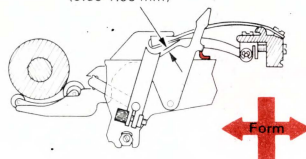
213 Paper Release (22-37) (22-324)

.040"-.055"
(1.02-1.40 mm)



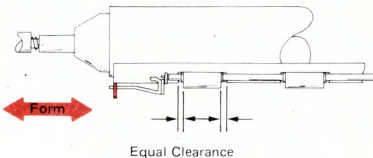
214 Paper Release Lever (22-252) (22-307)

.020"-.040"
(0.50-1.00 mm)



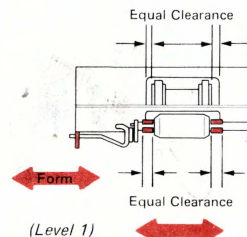
(Right Side View)

215 Deflector (22-16)



216 Front Feed Rolls (22-16)

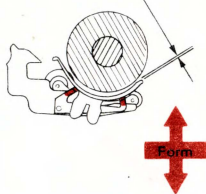
Model 75



217 Deflector Height (22-25)

Models 50/60

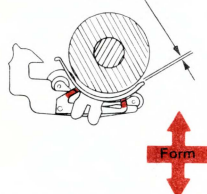
.024"-.032"
(0.61-0.81 mm)



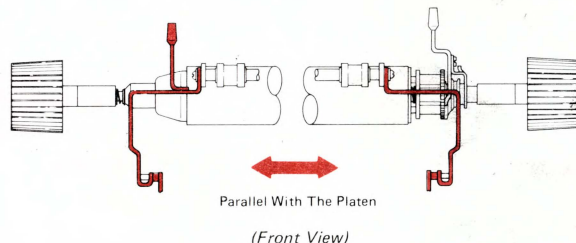
(22-65)

Models 75/85

.010"-.020"
(0.25-0.51 mm)

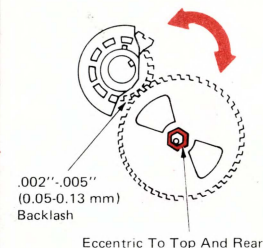


218 Paper Bail Arms (22-51, 59, 253, 263, 309, 310)



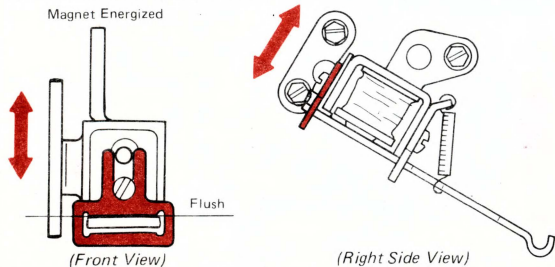
(Front View)

219 Index Driven Gear (22-116)

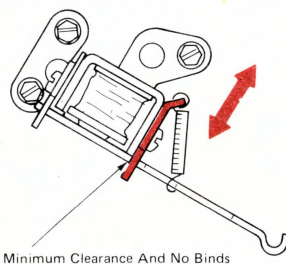


220 Index Magnet Upstop (22-125)

Magnet Energized

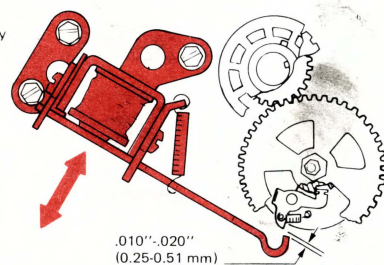


221 Index Magnet Pivot Plate (22-124)

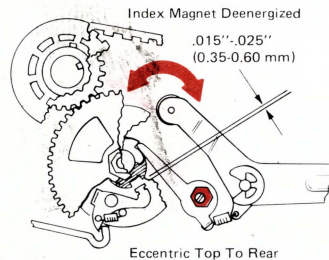


222 Index Magnet Position (22-160)

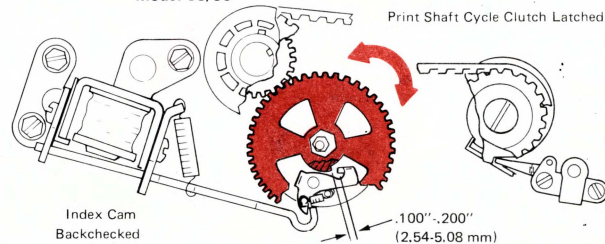
Magnet Manually
Energized



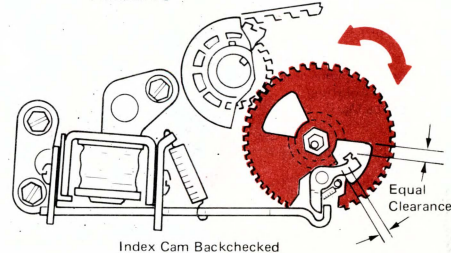
223 Index Cam Check Pawl (22-122)



224 Index Timing (22-115) Model 50/60

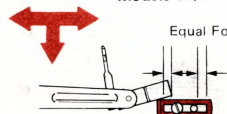


(22-219) Model 75

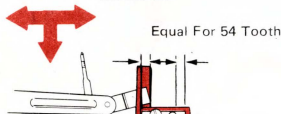


225 Multiplying Lever Stop (22-108)

Models 50/60

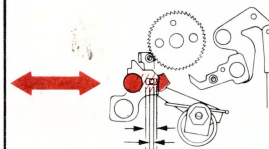


Model 75



Adjust All The Way Forward
For All Other Ratchets

226 Platen Overthrow Stop (22-129)



Level 2 Not Adjustable

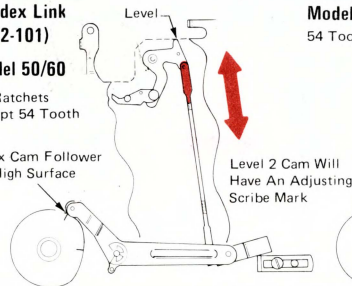
All Level 1 Models

227 Index Link (22-101)

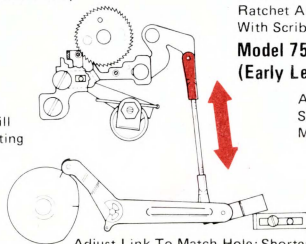
Model 50/60

All Ratchets
Except 54 Tooth

Index Cam Follower
On High Surface

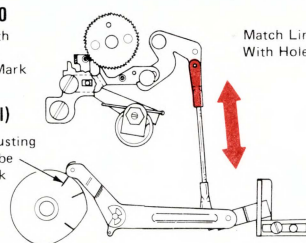


Model 50/60 54 Tooth Only

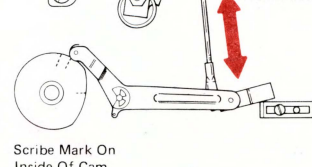


Model 50/60 With 54-Tooth Ratchet And With Scribe Mark Model 75 (Early Level)

Adjusting
Scribe Mark



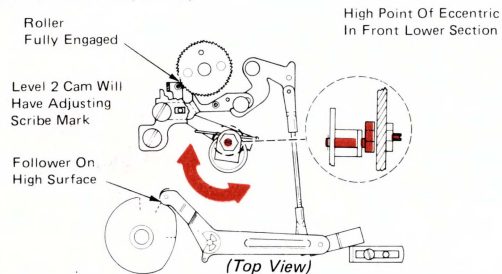
Model 50/60/75 All Ratchets (Late Level) 1. First Scribe Mark, Some Motion 2. Second Scribe Mark, No Motion



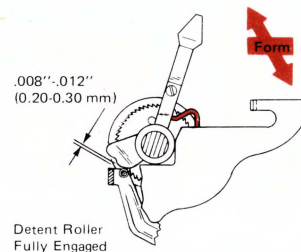
Adjust Link To Match Hole; Shorten One Turn.

Scribe Mark On
Inside Of Cam

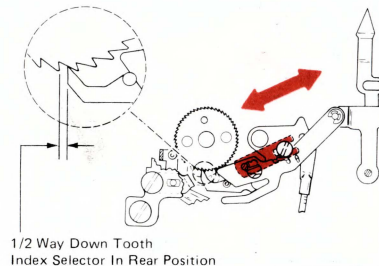
228 Platen Detent (22-127)



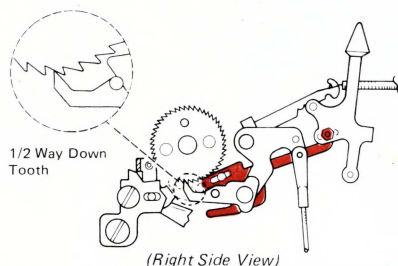
229 Platen Detent Release Lever (22-13)



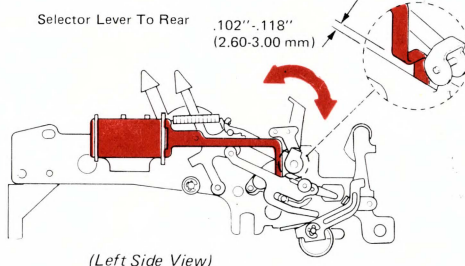
230 Index Selector (22-103) Models 50/60



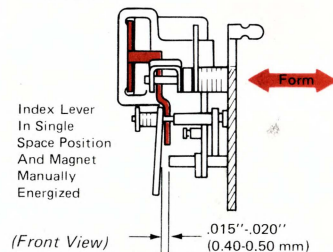
231 Index Selector (22-232) Model 75



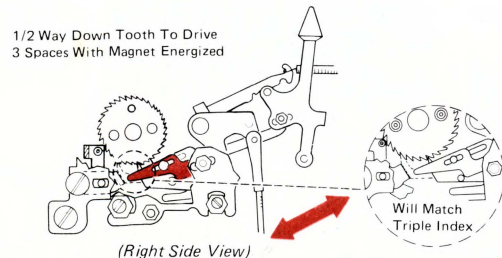
232 Index Selector Magnet (22-200) Model 75



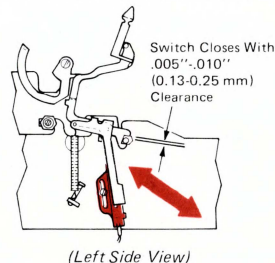
233 Index Selector Armature (22-201) Model 75



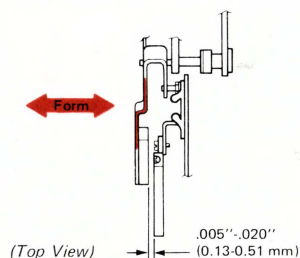
234 Triple Index Pawl Guide (22-233) Model 75



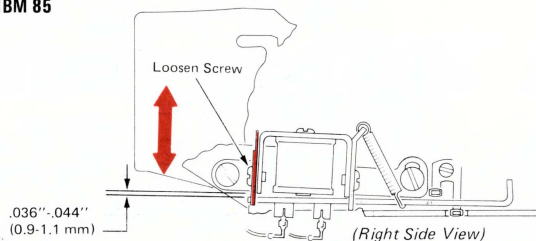
235 Paper Insertion Reed Switch (22-259) Model 75



236 Paper Insertion Bellcrank (22-262)

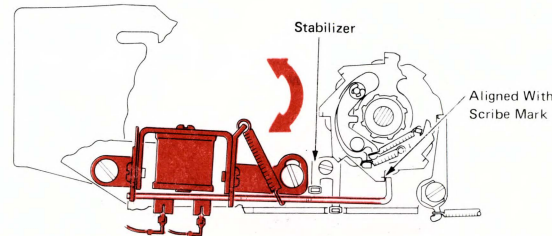


237 Index Magnet Upstop (23-1) IBM 85



NOTE: Ensure The Stabilizer Does Not Interfere With This Adjustment.

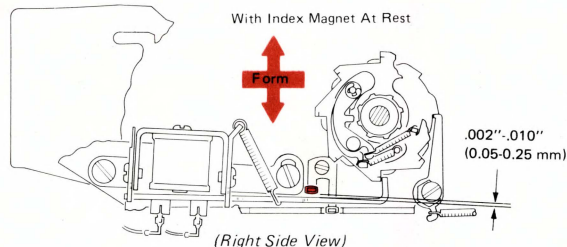
238 Index Magnet (23-1) IBM 85



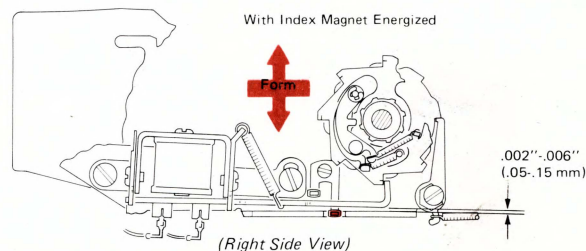
NOTE: Ensure The Armature Stabilizer Does Not Interfere With This Adjustment

239 Armature Stabilizer (23-53) IBM 85

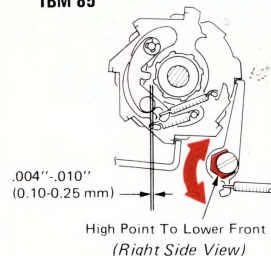
A.



B.

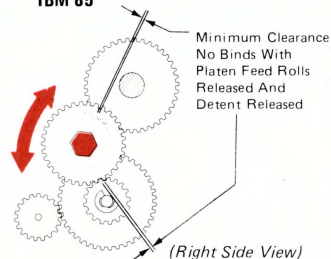


240 Check Pawl (23-10) IBM 85

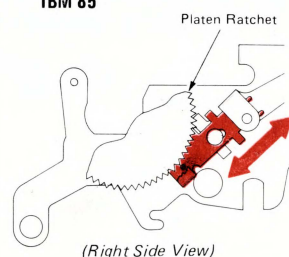


Turn Eccentric Counterclockwise Until Pawls Buzz. Then Turn Clockwise Until Pawls Just Stop Buzzing.

241 Index Gear Mesh (23-40) IBM 85



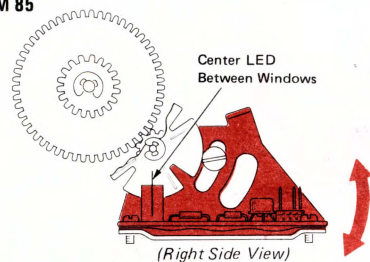
242 Detent Roller (23-32) IBM 85



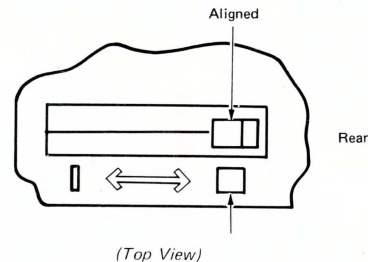
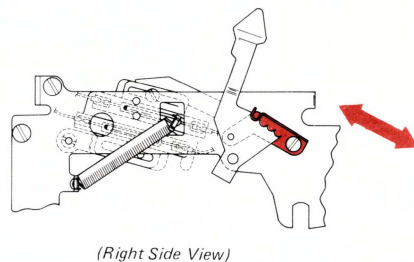
1. Paper Release To Rear, Detent Release Forward.
2. Hand Cycle 1-1/2 Spaces Index Operation.
3. Adj. The Detent To Engage And Rest On The Tip Of The Ratchet Tooth.
4. Check At 4 Different Places 90° Apart.

243 Index Feedback LED (23-18)

IBM 85

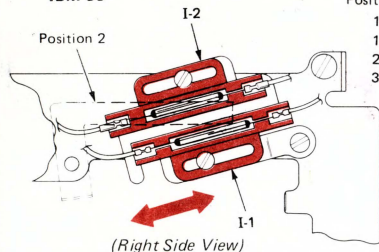


244 Index Selector Lever (23-23)



245 Index Reed Switches (23-26)

IBM 85

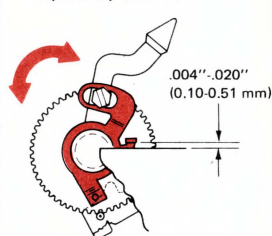


Line Space Position
1
1½
2
3

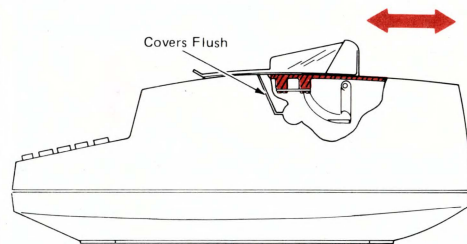
Bottom I-1 Condition
Open, +5 V
Open, +5 V
Closed, 0 V
Closed, 0 V

Top I-2 Condition
Open, +5 V
Closed, 0 V
Closed, 0 V
Open, +5 V

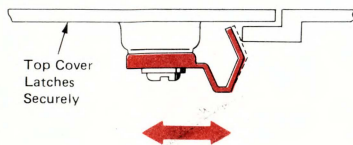
246 Platen Detent Release Lever (23-307) IBM 85



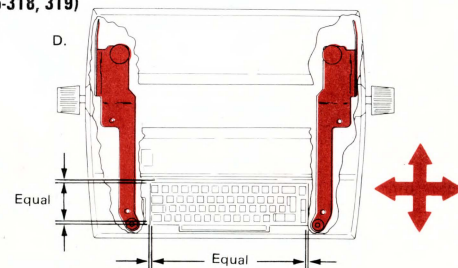
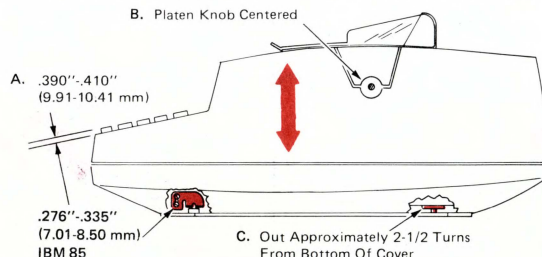
247 Top Cover (05-5) (05-315)



248 Top Cover Latches (05-6)

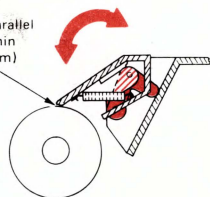


249 Shock Mounts A. (21-136) (21-313) B. & C. (05-15) D. (05-18, 28) (05-318, 319)

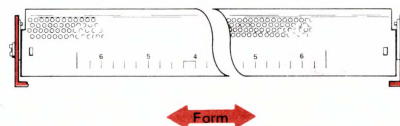
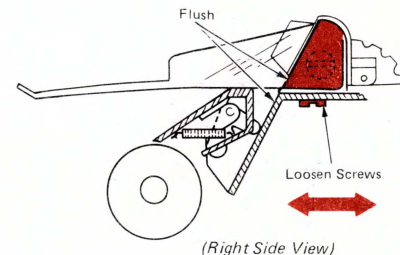
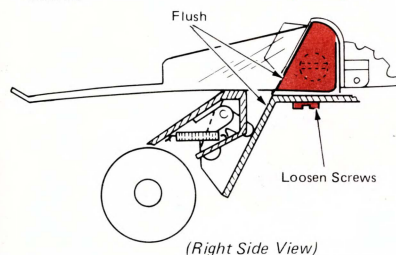
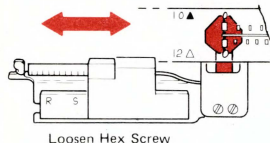


250 Paper Table (05-37, 39) (05-353, 354)

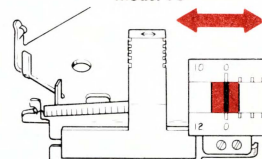
Paper Table Parallel
To Platen Within
.016" (0.41 mm)

**251 Paper Table Mounting Brackets (05-33) (05-313)**

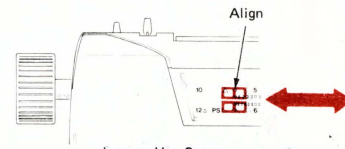
Minimum End Play No Binds

**252 Paper Support Bar (05-104) (05-333)****253 Paper Support Bar (05-104)
IBM 85****254 Carrier Pointer Left To Right
(15-52) (14-62)
Model 50/60**

Carrier At Left Frame

**(15-52) (14-62)
Model 75**

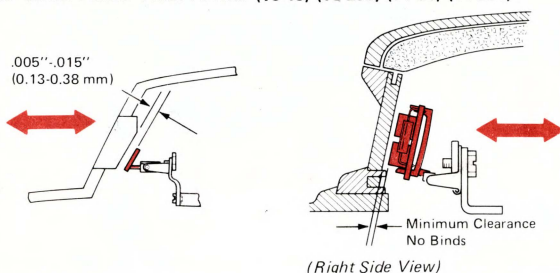
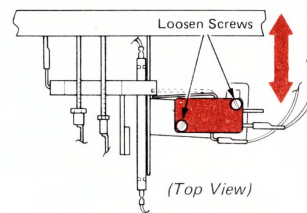
Loosen Hex Screw
Carrier At Left Frame

**(14-204)
Model 85**

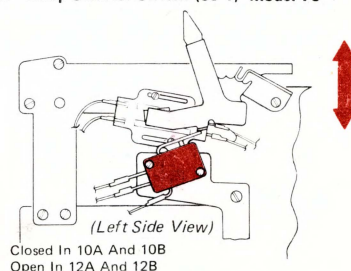
Loosen Hex Screw
Carrier At Left Frame

255 Carrier Pointer Front To Rear (15-45) (15-283) (14-65) (14-201)

.005"-.015"
(0.13-0.38 mm)

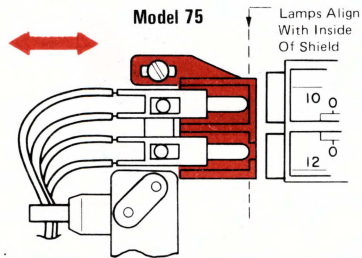
**256 Lamp On/Off Switch (09-1) Model 75**

Lamp's Switch Closes With Motor On
With .020"-.030" (0.51-0.76 mm) Overthrow

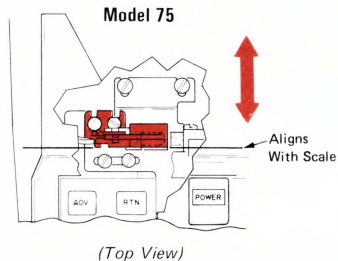
257 Lamp Selector Switch (09-1) Model 75

Closed In 10A And 10B
Open In 12A And 12B

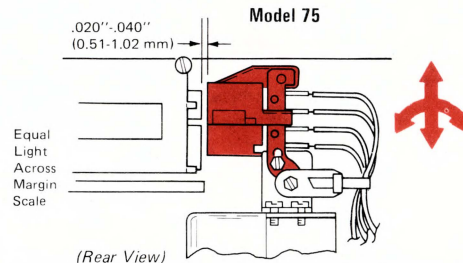
258 Lamp Shield (09-9)



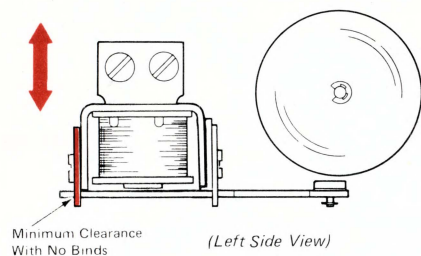
259 Lamp Mounting Bracket (09-17)



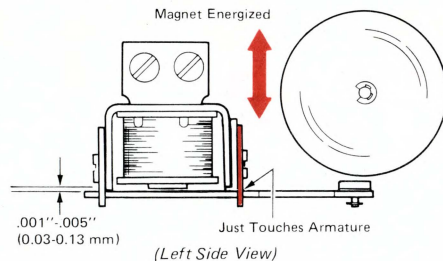
260 Lamp Bracket (09-10)



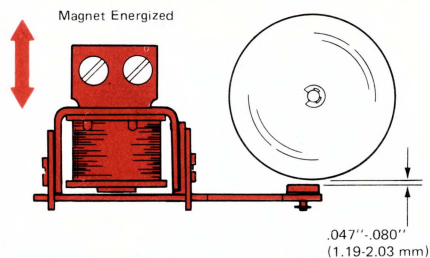
261 Bell Magnet Armature Pivot (20-34)



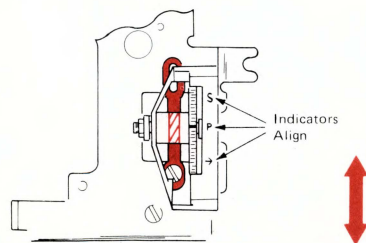
262 Bell Magnet Air Gap (20-33)



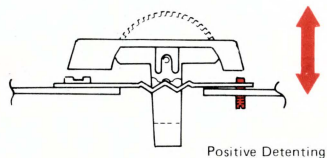
263 Bell Magnet (20-35)



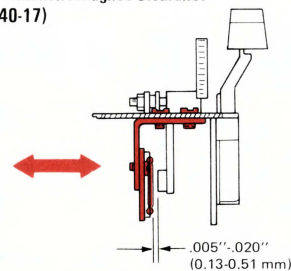
264 Detent Spring (40-35)



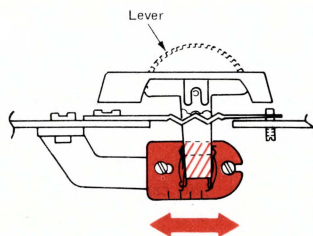
265 Dentent Tension (40-39)



266 Permanent Magnet Clearance (40-17)

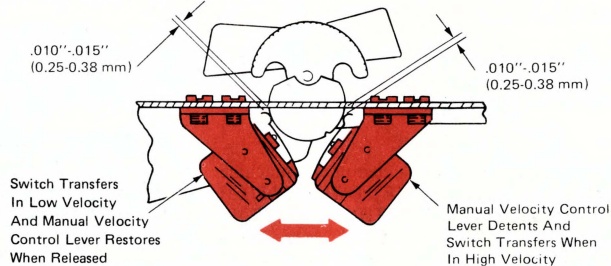


267 Reed Switch Position (40-13)

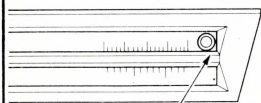


Lever Pos.	Switch Closes
Front	Rear
Center	None
Rear	Front

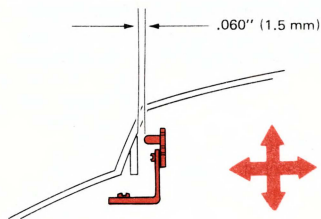
268 Manual Velocity Control Switches (42-14, 17)



269 MP Indicator Bracket (38-11)

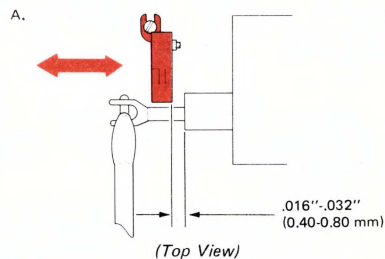


Approximate 4 O'Clock In
Hole Of Margin Scale



(Side View)

270 MP Switch (38-16)

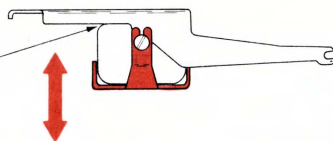


Switch Reliably OPERATES With Main Power
Switch In Both The On And Off Positions.

271 Battery Mounting Brackets (38-3, 4)

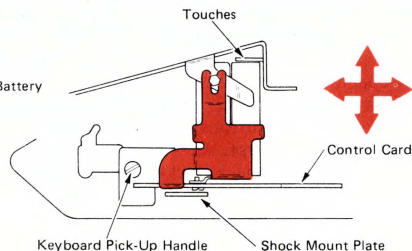
Front Battery

Touches



(Side View)

Rear Battery



Control Card Clears Keyboard Pick-Up Handle And Shock Mount Plate

PERFORM THE FUNCTIONAL CHECK BEFORE AND AFTER EVERY SERVICE CALL.

Before you start the functional check, review the following warnings about the memory and the electronic margins and tabs.

Warning

- When you are servicing a customer's machine **NEVER TURN OFF THE POWER SWITCH WITHOUT INFORMING THE OPERATOR.** Turning off the power switch clears the memory plus all the set tab and margin stops.
- Exercising the machine in the Document or Phrase storage mode affects the text the operator has entered into memory. Select an empty section of the memory if you need to store text.
- If you must change or clear stored tab or margin settings, write a list of the tab positions and margins so you can return the settings to their original positions.

NOTE: Remember these items as you service the machine.

Visual Inspection

Look at the machine carefully for any loose, damaged or missing parts. Also look for pencils, erasers, paper clips, or any unusual material in the machine.

Power Switch/Motor Switch

With the power switch on, turn on the motor switch. The machine should begin motor switch reset just before the switch detents and just after the AC motor begins to run. With the motor on you should not hear any unusual noise from the machine.

Semi-Automatic Paper Insertion

Insert a sheet of paper. Pull the paper bail lever all the way forward, then release it. The platen should index to the proper writing line.

Paper Release

Pull the paper release forward. The paper should freely move around the platen and to the left and right. Push the lever to the rear. The feed rolls should hold the paper tightly.

Detent Release

Pull the detent release lever forward. Make sure the platen detent is fully disengaged from the platen gear. Push the detent release lever to the rear. Make sure the platen detent is fully engaged with the platen gear.

Platen Variable

Push the right platen knob in all the way. The platen should turn freely. The ratchet should engage the platen when the knob is released.

Bell

Set a right margin. Tab or type through the right margin. The bell should ring five to seven characters before the carrier reaches the set right margin, or at the beginning of the last tab operation before the right margin.

Keyboard

Press down all the keybuttons including the operational keybuttons (Shift, Backspace, Carrier Return, and others). All keybuttons should move down easily and the correct operation should occur before the keybutton bottoms.

Repeat Characters

Press and release the Hyphen/Underscore keybutton. The correct character should print one time only. The character should repeat when the keybutton is held for more than one-half second. Repeat this procedure for the period, X, Backspace, Carrier Return, and Index.

Tab

Operate the tab. The carrier should move to the right before the keybutton contacts the downstop.

Shift

Type alternate uppercase and lowercase characters. The characters should print in the proper case. Slowly press the Shift Lock. The keybutton should lock down just as or slightly after shift occurs. Lock the Shift in uppercase and type a full line of underscores. The lock should not release by vibration.

The shift should unlock when either Shift keybutton is lightly pressed. Allow the Shift keybutton to move up. The machine should shift to lower case before the Shift keybutton reaches the rest position.

Error Correction

Type a character, then press the correcting keybutton one time. The character must be completely removed from the paper (or covered up if cover-up tape is used).

Linespacing

Type several lines of underscores in all the linespace lever positions. The space between the lines should be even for all linespace lever positions. The lever should detent in all positions. Check and make sure the machine indexes the number of lines indicated by the position of the linespace lever.

Pitch Selection

When the pitch selection lever is moved to different positions, the carrier should move to the set left margin position for each pitch. When the pitch selection lever is moved, the proper lighted carrier position indicator should light.

Cardholder

1. Type a line of *Hs* in uppercase, 10 pitch or 12 pitch. The horizontal line on the cardholder should be parallel to the bottom of the *Hs*.
2. Move the carrier and platen so one of the *Hs* is in the box at the top of the cardholder. The *H* should be centered in the box.

Lighted Carrier Position Indicator

Move the carrier to the far left side. The carrier pointer should line up with the zero on the margin scale.

Impression Control

1. Move the impression control lever from 1 to 5. The element should move away from the platen.
2. Remove the cassette and look at the ribbon. The pattern should look like this:



HHHHHHHHHHHHHHH
HHHHHHHHHHHHHHH
HHHHHHHHHHHHHHH

3. The characters should not overlap and should be positioned on the ribbon with a clearance at the top and bottom edge.
4. Inspect the copy for ribbon flaking and ribbon particles on the copy.

5. With a Tech III ribbon installed on the machine, inspect the ribbon pattern. The characters should overlap and there should be a clearance at the top and bottom edge of the ribbon. Type several lines of underscores. The type should not fade.
6. Inspect the ribbon. There should be no folds or twists.
7. Operate the spacebar. The ribbon should not feed.
8. Look at the correcting tape. The pattern should look like this:



HHHHHHHHHHHHHHH

9. The characters should not overlap and should be centered on the tape.

Control Panel Check

1. Press Code plus R (D-04) three times. The print shaft cycles each time. The Auto Return and Hyphenate messages turn on in the following sequence:
 - a. Both the Auto Return and Hyphenate messages are on.
 - b. Both the Auto Return and Hyphenate messages are off.
 - c. The Auto Return message is on.

NOTE: Begin this sequence with the Auto Return message on.

2. Press Code plus L (C-09). The print shaft cycles. The Auto Return message goes out and the Columns message turns on. Press return (Rtn), then press Code plus L (C-09). The Auto Return message turns on and the Columns message turns off.
3. Press Store and a number (1-99). The print shaft cycles and the phrase message turns on. Press the Store keybutton. The print shaft cycles and the Phrase message turns off.
4. Select any EMPTY section of memory. Press Store and the character for the empty storage area. The Document message turns on and the print shaft cycles.
5. Type *AAA* (C-01), *BBB* (B-05), and *CCC* (B-03).
6. Press the return (Rtn) keybutton three times. The print shaft cycles and the carrier repositions.
7. Index the paper up and press advance (Adv). The print shaft cycles once and the carrier repositions.
8. Press delete (Del). The print shaft cycles once.
9. Press Play. *CCC* plays out.
10. Press return (Rtn) twice. The print shaft cycles and the carrier repositions.
11. Press delete (Del) twice. The print shaft cycles each time and deletes the remaining information.
12. Press Store. The print shaft cycles and the Document message goes off.

USE THE FUNCTIONAL CHECK BEFORE AND AFTER EVERY SERVICE CALL

This check will help when servicing a machine, particularly when the symptom is not known. When any part of the check indicates a failure, or possible failure, the correct diagnostic aid may be referred to for the cause.

Before making any repairs, it is necessary to isolate the failing area. A complete Functional Check is suggested.

NOTE: Check with the operator before turning main power off.

Visual Inspection

Look at the machine carefully for any loose, damaged or missing parts. Also, look for foreign material in the machine, such as pencils, erasers and paper clips.

Power Switch/Motor Switch

1. Turn the power switch on.
2. Turn the motor switch on; the machine should POR just before the switch detents. The carrier will automatically advance to the set left margin if the power switch was already on.

With the motor on, there should be no excessive noise from the machine.

Paper Insertion

With paper placed to the rear of the platen, move the paper bail lever to the fully forward position, then release. The platen should index to the proper writing line. The paper should feed straight and not wrinkle or tear.

Paper Release

Pull the paper bail forward. Make sure the feed rolls hold the paper tightly. Pull the paper release lever forward. The paper should be free to move around the platen and left or right.

Detent Release

Pull the detent release lever forward. Make sure the platen rotates and the detent disengages from the ratchet.

Platen Variable

Push the left platen knob to the right. The platen should now turn freely. The ratchet should engage the platen when the knob is released.

Keyboard

Perform a strikeup of every character. All key-buttons should move down easily and the correct character should print before the keybutton stops.

Repeat Characters

Lightly press the Hyphen/Underscore keybutton. The correct character should print one time only. The character should repeat when more pressure is applied. Excessive pressure on the keybutton should not stop the repeat operation. Repeat this step for all other repeat characters and Spacebar, Backspace, Carrier Return and Index.

Tab

Operate the tab. The carrier should move to the right before the keybutton stops.

Shift

Type alternate uppercase and lowercase characters. The characters should print in the proper case.

Slowly press the shift lock. The button should lock down just as, or slightly after, a shift occurs.

Lock the shift in uppercase and type a full line of underscores. The lock should not release.

The shift should unlock when either shift button is lightly pressed. Allow the shift button to move up. The machine should shift to lowercase before the shift button stops moving up.

Printer

Set the right margin at 70/84; return to 0. Press Code and keyboard two uppercase C's. Allow the Printer Exerciser to play back for several lines. Check the playback for the following conditions:

- The correct characters should have printed.
- All characters should have even color and impression.
- No characters should be visibly out of position.
- There should be even spacing between characters and no overlap.
- There should be no excessive noise.

The bell should not ring and the machine should continue the Printer Exercise until the motor switch is turned off.

Linespacing

Type several lines of underscores in all linespace lever positions. The space between the lines should be even for all linespace lever positions. The lever should detent in all positions.

Pitch Selection

The carrier should move to the set left margin when the pitch selection lever is moved to a different position.

Make sure the correct margin is lighted in each pitch selection.

Scales

Type a line of *V*'s in uppercase, 10P or 12P. The horizontal lines on the cardholder should be parallel to the line of *V*'s.

The points on the bottom of the *V*'s should align with the vertical lines on the cardholder. Press the cardholder release lever. The cardholder should pivot up, allowing it to be easily removed. Reinstall the cardholder.

Operate the carrier return to the far left side. The carrier pointer should align with the 0 on the front scale.

Error Correction

1. Type a few characters, then press the correcting keybutton one time. The image must be completely removed from the paper (or covered up if cover-up tape is used).
2. Type another character. It should be in the same position as the original character. Repeat this step several times on the writing line.
3. Type several underscored characters. Press the correcting keybutton and allow it to repeat. All characters must be removed from the paper.

The correcting tape should look like the following example:

N - N - N - N - N - N - N - N - N

The characters should not overlap and should be positioned on the ribbon with a clearance from the top and bottom edge.

Ribbon System

Look at the ribbon you have been using and the typed samples. The pattern on a film ribbon should look like the following example:



The characters should not overlap and should be positioned on the ribbon with a clearance from the top and bottom edge. Inspect the copy for ribbon flaking and ribbon particles.

With a Tech III ribbon installed on the machine, inspect the ribbon pattern. The characters should overlap and there should be a clearance at the top and bottom edge of the ribbon. Type several lines of underscores. The type should not fade.

Inspect the ribbon in its path around the guides and rollers. There should be no folds in the ribbon.

Operate the spacebar. The ribbon should not feed.

Place the Stencil Control Lever in the stencil position and type several characters. The ribbon should not feed or lift.

Control And Message Panel Check

1. Press Code + R three times – The print shaft should cycle each time. The Auto Return and Hyphenate messages will illuminate in the following sequence: Auto Return, Auto Return and Hyphenate, both off, then Auto Return.

2. Press Code + L – The print shaft will cycle. The Auto Return message goes out and the Columns message illuminates. Carrier return and press Code + L – Columns message goes off.

To perform a function using a control switch, hold the control switch down and press the required keybutton. Then release the control switch.

1. Press Store and a number (1-99). The print shaft cycles and the Phrase message illuminates. Depress the Store button. The print shaft cycles and the Phrase message goes off.
2. Press Store and a letter (A-Z). The Document message will come on and the print shaft will cycle.
3. Keyboard *AAA BBB CCC*.
4. Operate Rtn three times. The print shaft will cycle and the carrier will reposition.
5. Manually roll the paper up and operate Advance. The print shaft will cycle and the carrier will reposition.
6. Operate Del – The print shaft will cycle.
7. Operate Play – CCC plays out.
8. Operate Rtn twice – The print shaft cycles and the carrier repositions.
9. Operate Del twice – The print shaft cycles each time and deletes the remaining information.
10. Operate Store – The print shaft cycles and the Document message goes off.

Printer Exerciser

TO START PRINTER EXERCISER — Set right margin at 70/84. Position carrier at zero on the margin scale. Shift to uppercase. Press two coded C's.

NOTE: Printer Exerciser may differ on logic boards of a different level and/or language.

TO STOP PRINTER EXERCISER — Turn motor switch off.

NOTE: Do NOT turn motor switch off during a carrier return. It may damage the escapement mechanism or the electronics.

Model 75 Printer Exerciser

The Printer Exerciser has two parts: Part one prints a zero, cycles seven times in no-print (overstrikes the zero), and then executes one more cycle that may or may not correct the zero. Part two types:

[IBM Ribbons/

The driver board is checked during part 1 of the Printer Exerciser. If a failure occurs, the message panel lights come on momentarily and the test stops. This indicates a bad driver board or a short circuit in the carrier. If no problem is detected in part 1, the Printer Exerciser continues.

Part 2 of the Printer Exerciser is a selection, print and alignment check. During part 2, the electronics checks the time taken to do an escapement operation. If an escapement operation is slightly slow, the bell rings for each failure and the typewriter locks up intermittently. If an escapement operation is very slow, the machine will lock up and payout will stop. (To start the Printer Exerciser again, turn motor switch off, then on, return to zero and start again.) If no problem is found by the electronics, the Printer Exerciser will repeat until stopped.

To return to normal typing, turn motor switch on. The carrier will return to zero on the margin scale, then advance to where the Printer Exerciser was stopped. At this point the machine will either complete part 1 of the Printer Exerciser or type two characters of part 2 before stopping. The machine is now ready for normal operations.

Model 50/60 Printer Exerciser

The Printer Exerciser should match the specifications described in the functional check (printer). To return to normal typing, turn the motor switch off and then on again. The carrier will return to zero and advance to the left margin.

Additional Checks, Model 60

1. Press Store plus a number. (Check with operator — do not use a storage area containing operator information.) The print shaft should cycle and the store light should come on. Press Store. The light should go off.
2. Press Del plus same number as step 1. The print shaft should cycle.

3. Latch down the Auto Rtn button. Set a right margin. Type through the margin. The carrier should automatically return after a character following a space or hyphen. With the Auto Rtn button up, the carrier should not return automatically.

PRINTER EXERCISER

The printer exerciser may be used as a diagnostic aid when servicing the machine.

Models 50/60

TO START THE PRINTER EXERCISER — Set the right margin at 70/84. Position the carrier at zero on the margin scale. Shift to uppercase. Depress two coded "C's."

NOTE: The printer exerciser may differ on logic boards of a different level and/or language.

TO STOP THE PRINTER EXERCISER — Turn motor switch off.

NOTE: Do NOT turn motor switch off during a carrier return. It may damage the escapement mechanism and/or the electronics.

Models 50/60

Level 1 [IBM Ribbons/

Level 2 [IBM Ribbons/ —

Level 3 [IBM Ribbons/ — [IBM Ribbons (10 And 12 Pitch Only Model 50)

The printer exerciser should match the specifications described in the functional check (printer). To return to normal typing, turn the motor switch off and then on again. The carrier will return to zero and advance to the set left-hand margin.

Model 75

The Model 75 printer exerciser has two parts. Part 1 checks the carrier magnet circuitry/driver board. Part 2 checks print, selection and also checks escapement timing. The following is a detailed explanation.

PART 1

TEST	MACHINE ACTION	EXPLANATION
V1	0 prints (no escapement)	High velocity magnet driver test
R1	No print cycle	Rotate 1 magnet driver test
R2	Shift to upper case	Rotate 2 magnet driver test
R2	Shift to lower case	Return element to original case
R3	No print cycle	Rotate 3 magnet driver test
T1	No print cycle	Tilt 1 magnet driver test
T2	No print cycle	Tilt 2 magnet driver test
RACK	No print cycle	Rack transfer driver test
V2	0 prints (no escapement)	Low velocity magnet driver test
CORR	0 lifts off partially 1	Correction magnet driver test

If a failure does occur, i.e., magnet driver or short in the magnet, all of the message panel lights blink once and the test stops. If this failure occurs, refer to the Printer Exerciser Diagnostic Chart.

PART 2

[IBM Ribbons ns/
sp bs bs

Part 2 of the printer exerciser is a selection, print, alignment and escapement check.

During part 2, the electronics checks emitter pulse length. A long emitter pulse length indicates slow escapement, causing the bell to ring. For a consistently slow escapement failure, the payout will stop and the machine will be in a system busy condition.

To start the printer exerciser again, turn motor switch off, then on, return to zero and start again. If no problem is found by the electronics, the printer exerciser will repeat until stopped.

To return to normal typing, turn motor switch on. The carrier will return to zero on the margin scale, then advance to where the printer exerciser was stopped. At this point, the machine will either complete part 1 of the printer exerciser or type two characters of part 2 before stopping. The machine is now ready for normal operations.

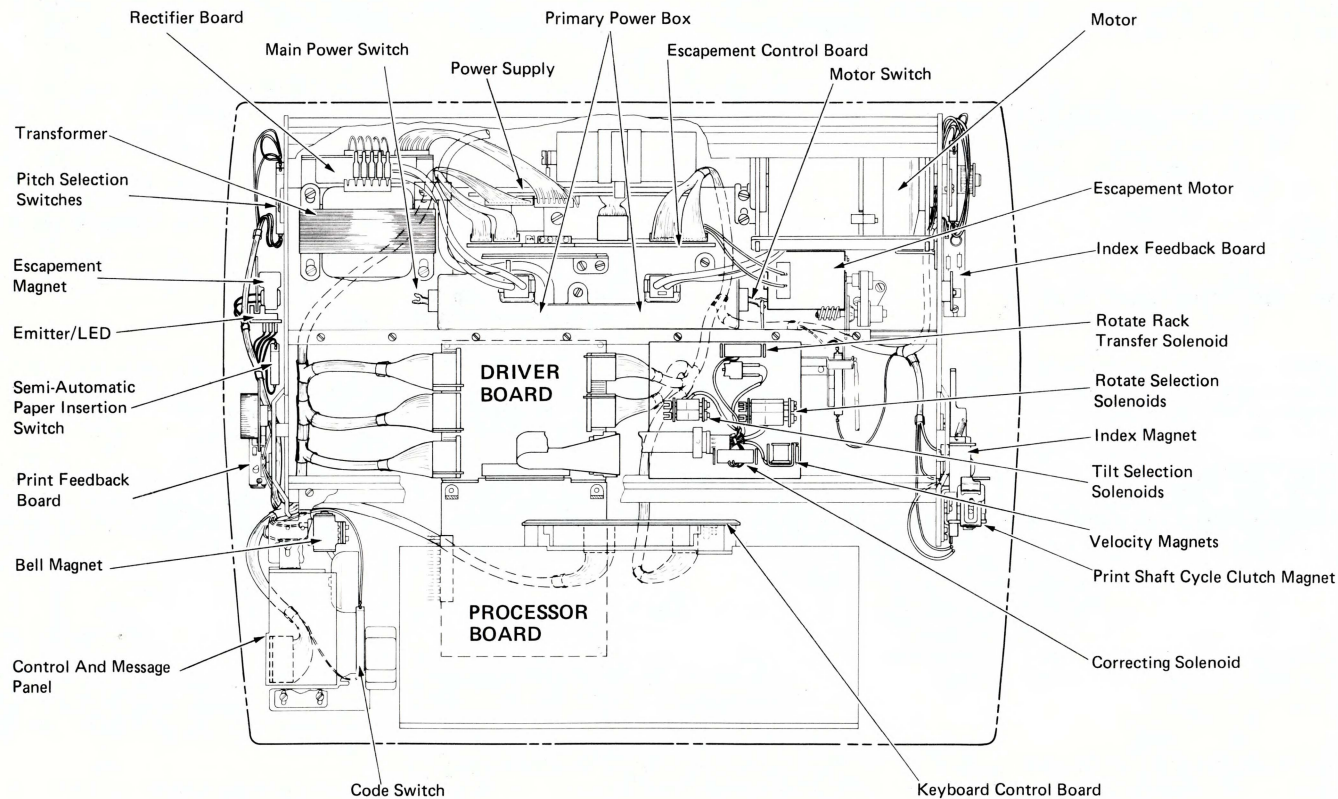
NOTE 1: With a level 1 velocity pack, the "0" may not lift off or may lift off partially; this is normal. During the correction test, the correction magnet is energized alone. The correction magnet requires more movement of its armature than V1 and V2. This may cause the armature not to have sufficient strength to operate the mechanism. (During normal operation, the correction magnet is never energized without V1 and V2.)

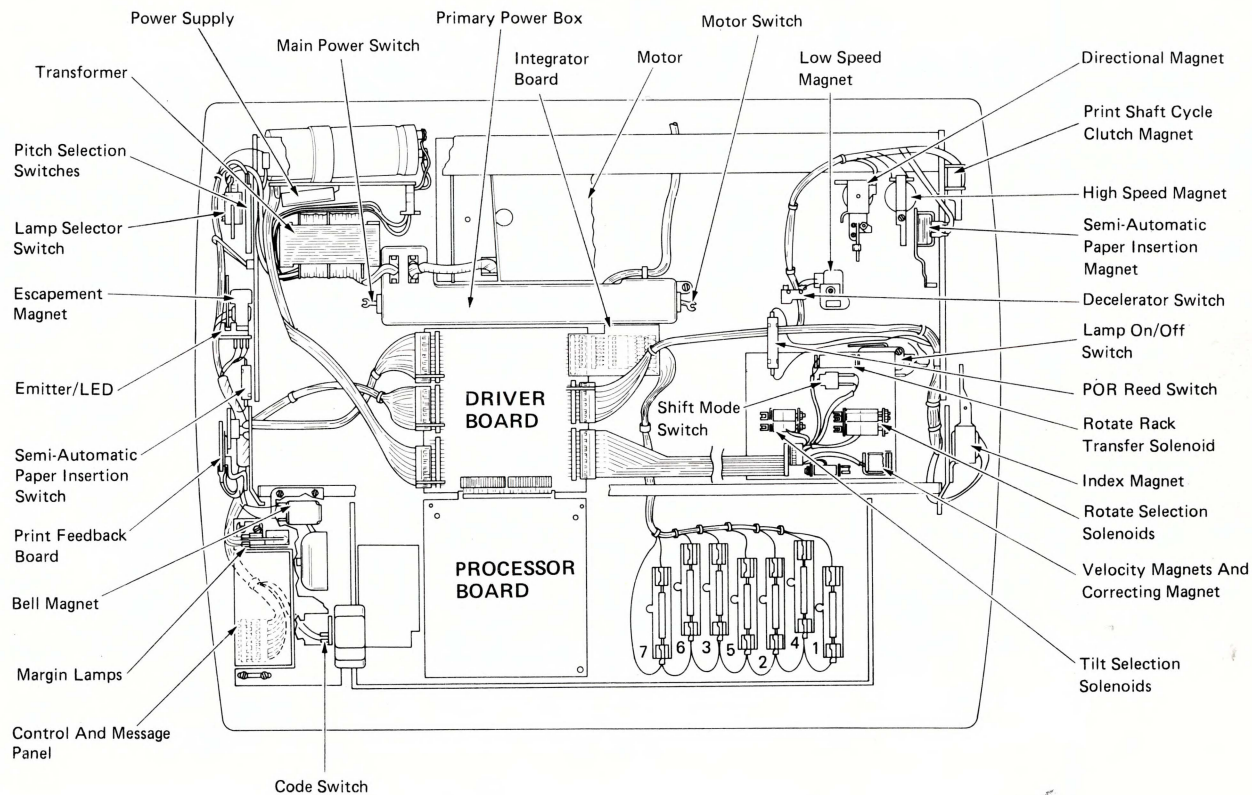
The "0" is printed twice during the V1 and V2 test. Since no velocity is applied during the correction test, the "0" may lift off partially.

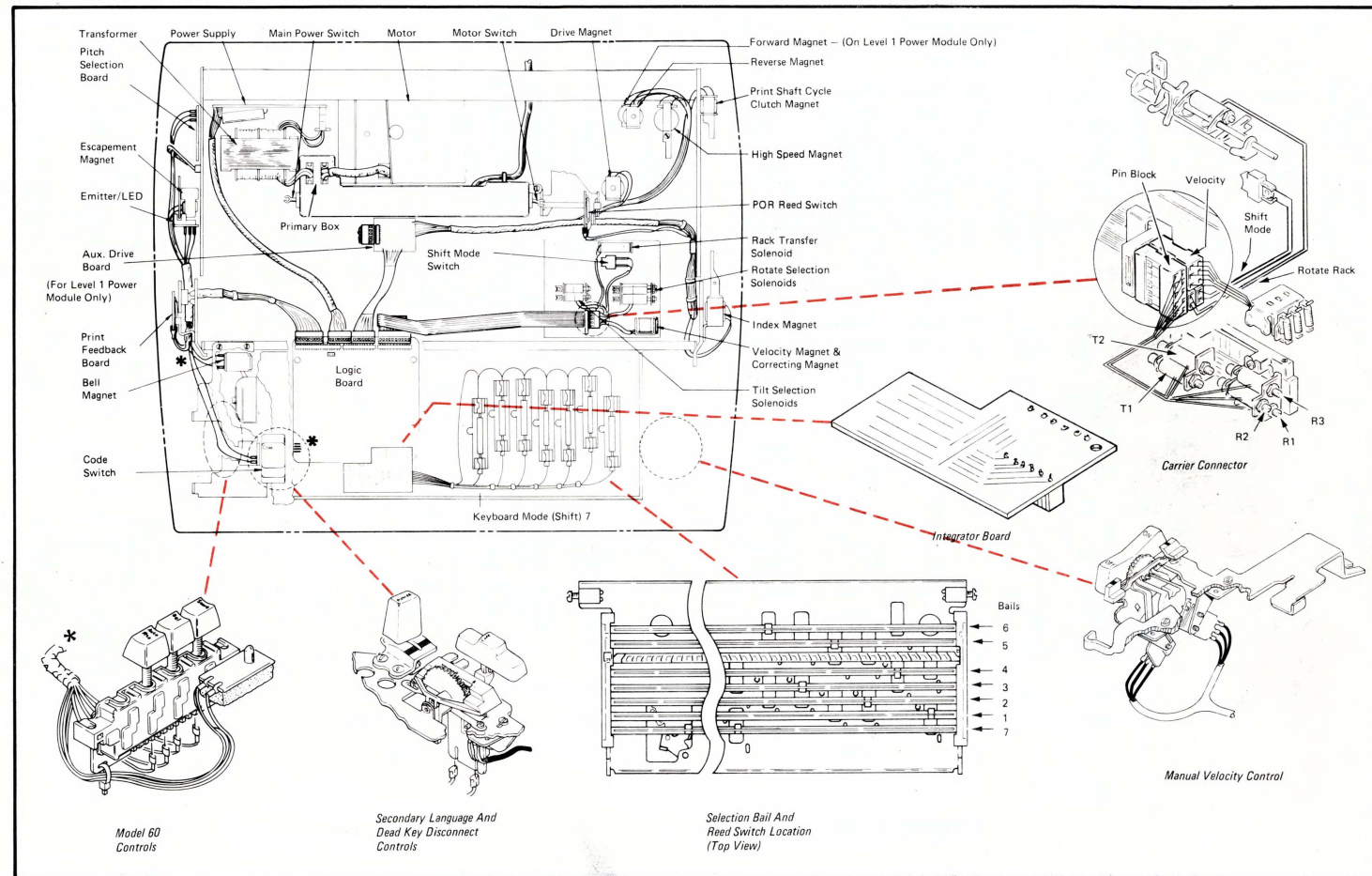
On machines with level 2 correction solenoids, the "0" will not correct because no velocity is applied.

NOTE 2: Level 2 processor board part 2 of printer exerciser — The brackets on the first line will be closing brackets. Every remaining line will begin with an opening bracket. The rest of the line will have closing brackets. (Level 1 has all opening brackets.)

If the motor switch is turned off following the fourth no print cycle, the uppercase zero will be selected for correction. The uppercase zero is a closing parenthesis [)] for domestic machines.







TRANSFORMER OUTPUT VOLTAGES
 (All secondary voltage wires from transformer disconnected.)

+Meter Lead	-Meter Lead	Static Voltage Range
Blue	Yellow	15-22 VAC
Orange	White	20-30 VAC
Orange	Red	10-15 VAC
White	Red	10-15 VAC

POWER SUPPLY BOARD CONNECTOR P-1

Pin	Signal	Static Voltage Range	Wire Termination
1	XPOR	3-5.5 V	K-1/Pin-3
2	POR	3-5.5 V	L-2/Pin-11
3	-5 V	-4.5-5.5 V	L-2/Pin-8
4	GND	0 V	K-1/Pin-1
5	X + 5 V	4.5-5.5 V	L-2/Pin-3
6	X + 5 V	4.5-5.5 V	K-1/Pin-4
7	+5 V	4.5-5.5 V	L-2/Pin-4
8	8.5 V	8-9 V	L-2/Pin-10
9	8.5 V	8-9 V	L-2/Pin-9
10	13 V	12.5-13.5 V	L-2/Pin-1
11	PORIN	Not Used	Not Used
12	GND	0 V	L-2/Pin-6
13	MGND	0 V	L-2/Pin-2

POWER SUPPLY BOARD CONNECTOR P-2
 (Disconnected)

Rectifier Output Voltages

+Meter Lead	-Meter Lead	Static Voltage Range
1	5	-1-25 VDC
2	4	18-40 VDC
3	5	13-35 VDC
6	4	9-20 VDC
7	5	6-25 VDC

POWER SUPPLY BOARD CONNECTOR P-2
 (Connected)

Pin	Signal	Static Voltage Range	Wire Termination
1	N BULK	-16-24 VDC	Rectifier Board
2	RN BULK	28-42 VDC	Rectifier Board
3	P BULK	20-30 VDC	Rectifier Board
4	RN RET	0 V	Rectifier Board
5	HP RET	0 V	Rectifier Board
6	RN CTR	14.4-21.6 VDC	Rectifier Board
7	XFMR	6.8-10.2 VDC	Rectifier Board

ESCAPEMENT CONTROL BOARD CONNECTOR E-1

Pin	Signal	Static Voltage Range	Wire Termination
1	X + 5 V	4.5-5.5 V	Print Feedback Board Pin-4
2	X + 5 V	4.5-5.5 V	ESC Feedback Board/Pin-1
3	GND	0 V	Print Feedback Board/Pin-2
4	GND	0 V	ESC Feedback Board/Pin-2
5	EMTB	3-5.5 V	ESC Emitter Board/Pin-3
6	ESCM	11.5-13.5 V	ESC Magnet/Pin-2
7	PFBS	3-5.5 V	PFB Emitter/Pin-1
8	+13 V	11.5-14.5 V	Bell Mag/Pin-1 ESC Mag/Pin-1

ESCAPEMENT CONTROL BOARD CONNECTOR E-2

Pin	Signal	Static Voltage Range	Wire Termination
1	ESC	3-5.5 V	L-5/Pin-1
2	PFB	3-5.5 V	K-1/Pin-7
3	PFB	3-5.5 V	L-5/Pin-4
4	GND	0 V	Blank
5	EMIT	3-5.5 V	L-5/Pin-6

ESCAPEMENT CONTROL BOARD CONNECTOR E-3
 DIAGNOSTIC JUMPER

ESCAPEMENT CONTROL BOARD CONNECTOR E-4

Pin	Signal	Static Voltage Range	Wire Termination
1	VOFF	3-5.5 V	p
2	XPOR	3-5.5 V	o
3	PORS	3-5.5 V	w s
4	X + 5 V	4.5-5.5 V	e u
5	+13 V	12.5-13.5 V	r p
6	GND	0 V	p B
7	MGND	0 V	i o
8	MGND	0 V	y a
9	+24 V	21.5-26.5 V	r
10	+24 V	21.5-26.5 V	d

ESCAPEMENT CONTROL BOARD CONNECTOR E-5

Pin	Signal	Static Voltage Range	Wire Termination
1	GND	0 V	See Ground Path Chart
2	+13 V	13 V	PSCC Magnet/ Ind. Magnet
3	I-2	3-5.5 V *(Move Selector)	I-2 Index Select SW/Pin-1
4	I-1	3-5.5 V *(Move Selector)	I-1 Index Select SW/Pin-1
5	PSCCM	11.5-14.5 V	PSCC Magnet/ Pin-2
6	INDM	11.5-14.5 V	Index Magnet/ Pin-2
7	PORS	3-5.5 V	POR Switch/ Pin-2
8	X + 5 V	4.5-5.5 V	Index Feedback BD/Pin-1
9	IFBB	3-5.5 V	Index Feedback BD/Pin-4

***Index Lever Position**

	I-1	I-2
1	5 V	5 V
1½	5 V	0 V
2	0 V	0 V
3	0 V	5 V

ESCAPEMENT CONTROL BOARD CONNECTOR E-6

Pin	Signal	Static Voltage Range	Wire Termination
1	SAPI	3-5.5 V	L-8/Pin-7
2	IND	3-5.5 V	L-8/Pin-1
3	REV	3-5.5 V	L-8/Pin-3
4	HIS	3-5.5 V	L-8/Pin-4
5	PSCC	3-5.5 V	L-8/Pin-5

KEYBOARD CONTROL BOARD CONNECTOR K-1

Pin	Signal	Static Voltage Range	Wire Termination
1	GND	0 V	P-1/Pin-4
2	CODE	3-5.5 V	L-5/Pin-8
3	XPOR	3-5.5 V	P-1/Pin-1
4	X + 5 V	4.5-5.5 V	P-1/Pin-6
5	DELETE	3-5.5 V	M-1/Pin-5
6	DELETE	3-5.5 V	L-4/Pin-9
7	PFB	3-5.5 V	E-2/Pin-2
8	CODE S	3-5.5 V	Code Switch/ Pin-2

KEYBOARD CONTROL BOARD CONNECTOR K-2

Pin	Signal	Static Voltage Range	Wire Termination
1	KBMD	3-5.5 V	L-10/Pin-8
2	B6	3-5.5 V	L-10/Pin-7
3	B3	3-5.5 V	L-10/Pin-6
4	B5	3-5.5 V	L-10/Pin-5
5	B2	3-5.5 V	L-10/Pin-4
6	B4	3-5.5 V	L-10/Pin-3
7	B1	3-5.5 V	L-10/Pin-2
8	GND	0 V	L-10/Pin-1

DRIVER BOARD CONNECTOR L-2

Pin	Signal	Static Voltage Range	Wire Termination
1	+13 V	12.5-13.5 V	P-1/Pin-10
2	MGND	0 V	P-1/Pin-13
3	X +5 V	4.5-5.5 V	P-1/Pin-5
4	+5 V	4.5-5.5 V	P-1/Pin-7
5	Blank	0 V	Blank
6	GND	0 V	P-1/Pin-12
7	PORIN	Not Used	Not Used
8	-5 V	-4.5-(-5.5 V)	P-1/Pin-3
9	+8.5 V	8.9 V	P-1/Pin-9
10	+8.5 V	8.9 V	P-1/Pin-8
11	POR	3-5.5 V	P-1/Pin-2

DRIVER BOARD CONNECTOR L-5

Pin	Signal	Static Voltage Range	Wire Termination
1	ESC	3-5.5 V	E-2/Pin-1
2	Bell	3-5.5 V	Bell Magnet/ Pin-2
3	Wait	3-5.5 V	M-1/Pin-1
4	PFB	3-5.5 V	E-2/Pin-3
5	P1	3-5.5 V *(Move Selector)	P1 Pitch Select SW/Pin-1
6	Emit	3-5.5 V	E-2/Pin-5
7	P2	3-5.5 V *(Move Selector)	P2 Pitch Select SW/Pin-1
8	Code	3-5.5 V	K-1/Pin-2
9	Insert	3-5.5 V	SAPI, SW/Pin-2
10	GND	0 V	See Ground Path Chart

DRIVER CONNECTOR BOARD L-7

Pin	Signal	Static Voltage Range	Wire Termination
1	10 PT	*.3 V or 1.5 V	LCPI/Pin-1
2	12 PT	#.3 V or 1.5 V	LCPI/Pin-3
3	V1	11.5-14.5 V	Velocity 1 Magnet
4	V2	11.5-14.5 V	Velocity 2 Magnet
5	CORR	11.5-14.5 V	Correction Solenoid
6	+13 V	12.5-13.5 V	Supply Voltage for Carrier
7	R-1	11.5-14.5 V	Rotate 1 Solenoid
8	GND	0 V	Ground, Shift Mode Switch
9	RACK	11.5-14.5 V	Rack Transfer Solenoid
10	SHMD	L/C 5 V, U/C 0 V	Shift Mode Switch
11	R-3	11.5-14.5 V	Rotate 3 Solenoid
12	T-1	11.5-14.5 V	Tilt 1 Solenoid
13	R-2	11.5-14.5 V	Rotate 2 Solenoid
14	T-2	11.5-14.5 V	Tilt 2 Solenoid

*When in 10 Pitch.

≠When in 12 Pitch, PS or PSN.

DRIVER BOARD CONNECTOR L-8

Pin	Signal	Static Voltage Range	Wire Termination
1	IND	3-5.5 V	E-6/Pin-2
2	GND	0 V	Blank
3	REV	3-5.5 V	E-6/Pin-3
4	HIS	3-5.5 V	E-6/Pin-4
5	PSCC	3-5.5 V	E-6/Pin-5
6	GND	0 V	Blank
7	SAPI	3-5.5 V	E-6/Pin-1

DRIVER BOARD CONNECTOR L-9
WORLD TRADE FEATURES

DRIVER BOARD CONNECTOR L-4

Pin	Signal	Static Voltage Range	Wire Termination
1	+13 V	12.5-13.5 V	M-1/Pin-8
2	COL	12.5-13.5 V	M-1/Pin-3
3	Play	3-5.5 V	M-1/Pin-4
4	A-RTN	0 V(+12 LED Off)	M-1/Pin-6
5	PHR	12.5-13.5 V	M-1/Pin-11
6	DOC	12.5-13.5 V	M-1/Pin-10
7	HYP	12.5-13.5 V	M-1/Pin-7
8	RTN	3-5.5 V	M-1/Pin-13
9	DEL	3-5.5 V	K-1/Pin-6
10	STR	3-5.5 V	M-1/Pin-5
11	ADV	3-5.5 V	M-1/Pin-2

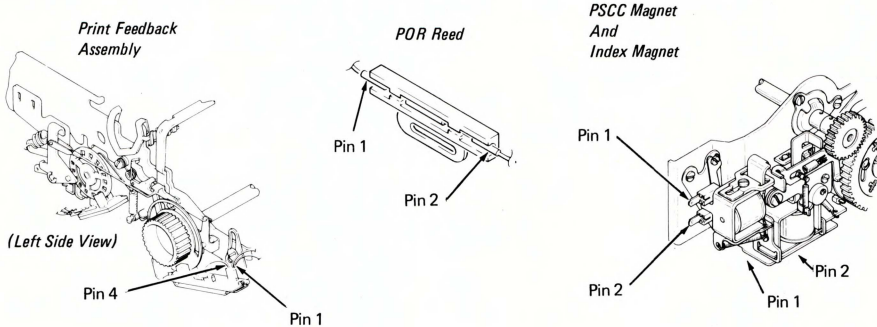
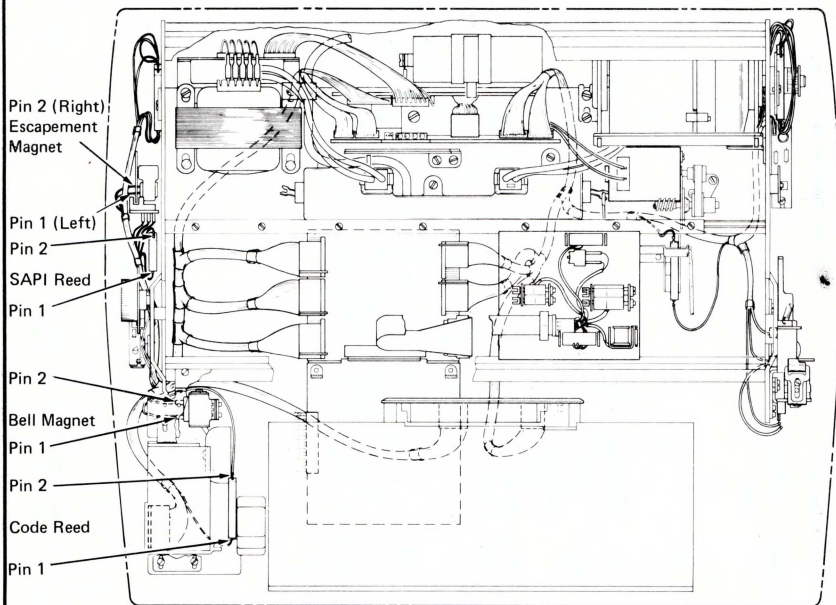
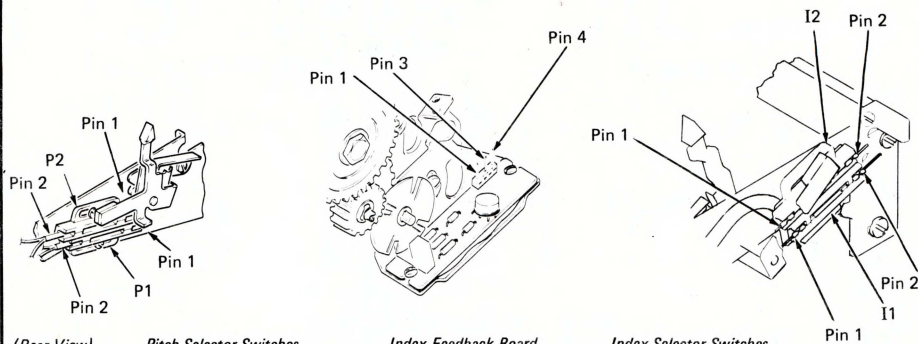
*Pitch	P-1	P-2
10	0 V	5 V
12	0 V	0 V
PSN	5 V	0 V
PS	5 V	5 V

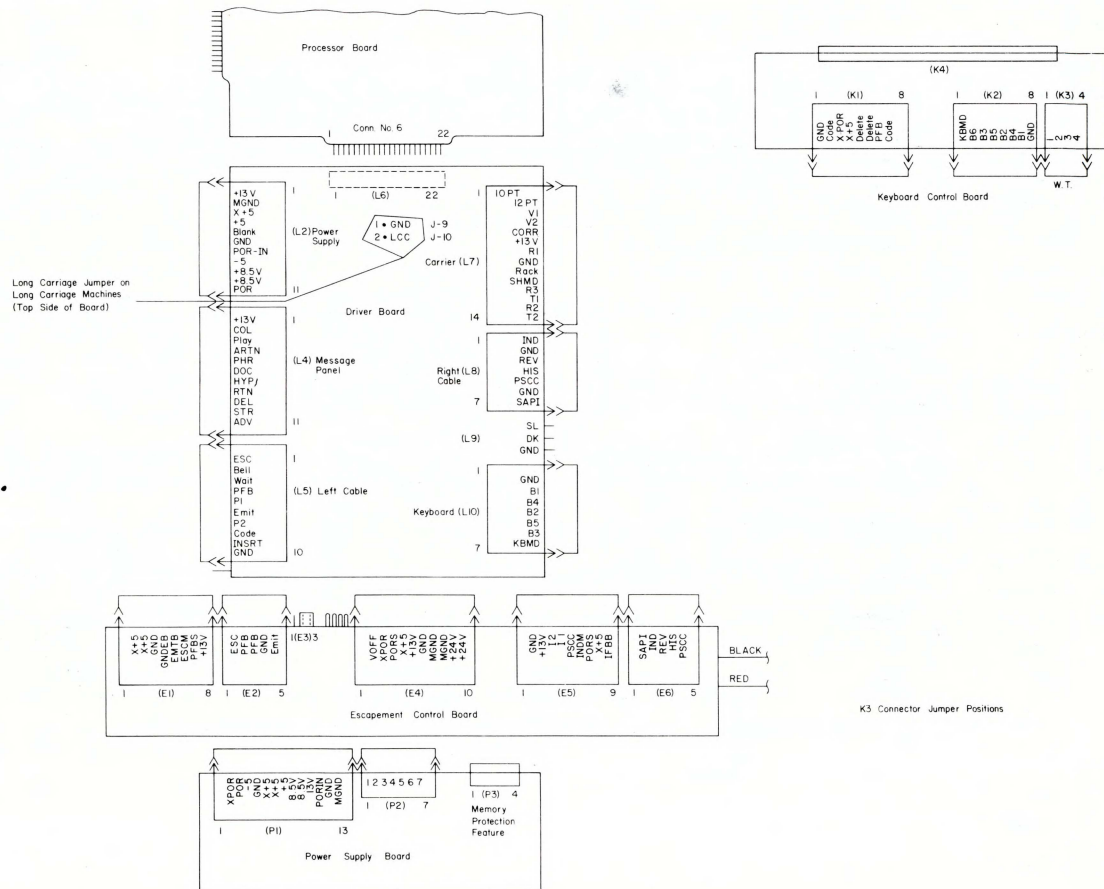
DRIVER BOARD CONNECTOR L-6
DRIVER/PROCESSOR BOARD

DRIVER BOARD CONNECTOR L-10

Pin	Signal	Static Voltage Range	Wire Termination
1	GND	0 V	K-2/Pin-8
2	B1	3-5.5 V	K-2/Pin-7
3	B4	3-5.5 V	K-2/Pin-6
4	B2	3-5.5 V	K-2/Pin-5
5	B5	3-5.5 V	K-2/Pin-4
6	B3	3-5.5 V	K-2/Pin-3
7	B6	3-5.5 V	K-2/Pin-2
8	KBMD	3-5.5 V	K-2/Pin-1

CABLE AND CONNECTOR NUMBERING





MESSAGE CONTROL PANEL M-1

Pin	Signal	Static Voltage Range	Wire Termination
Note: Connector is numbered rear (1) to front (13).			
13	RTN SW	3-5.5 V	L-4/Pin-8
12	GND	0 V	L-5/Pin-10
11	PHR LED	12.5-13.5 V	L-4/Pin-5
10	DOC	12.5-13.5 V	L-4/Pin-6
9	DEL SW	3-5.5 V	K-1/Pin-5
8	+13 V	12.5-13.5 V	L-4/Pin-1
7	HYP LED	12.5-13.5 V	L-4/Pin-7
6	A-RTN LED	12.5-13.5 V (LED Off)	L-4/Pin-4
5	STR SW	3-5.5 V	L-4/Pin-10
4	PLAY SW	3-5.5 V	L-4/Pin-3
3	COL LED	12.5-13.5 V	L-4/Pin-2
2	ADV SW	3-5.5 V	L-4/Pin-11
1	WAIT LED	12.5-13.5 V	L-5/Pin-3

INDEX FEEDBACK EMITTER BOARD

Pin	Signal	Static Voltage Range	Wire Termination
1	X + 5 V	4.5-5.5 V	E5/Pin-8
2	Blank		
3	GND	0 V	E5/Pin-1
4	IFBB	3-5.5 V	E5/Pin-9

ESC EMITTER BOARD

Pin	Signal	Static Voltage Range	Wire Termination
1	X + 5 V	4.5-5.5 V	E1/Pin-2
2	GND	0 V	E1/Pin-4
3	Emit B	3-5.5 V	E1/Pin-5

PFB EMITTER BOARD

Pin	Signal	Static Voltage Range	Wire Termination
1	PFBS	3-5.5 V	E1/Pin-7
2	GND	0 V	E1/Pin-3
3	Blank		
4	X + 5 V	4.5-5.5 V	E1/Pin-1

GROUND PATH CHART

Source	To	To	To	To	Terminates
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Power Supply P-1

Pin-4					K-1/Pin-1
Pin-12					L-2/Pin-6
Pin-13					L-2/Pin-2
Soldered To Power Supply Board					E-4/Pin-3
"					E-4/Pin-4
"					E-4/Pin-5

Driver Board L-5

Pin-10	Code SW/ Pin-1	SAPI SW/ Pin-2	Pitch Select SW1/ Pin-2	Pitch Select SW2/ Pin-2	M-1/Pin-12
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Driver Board L-10

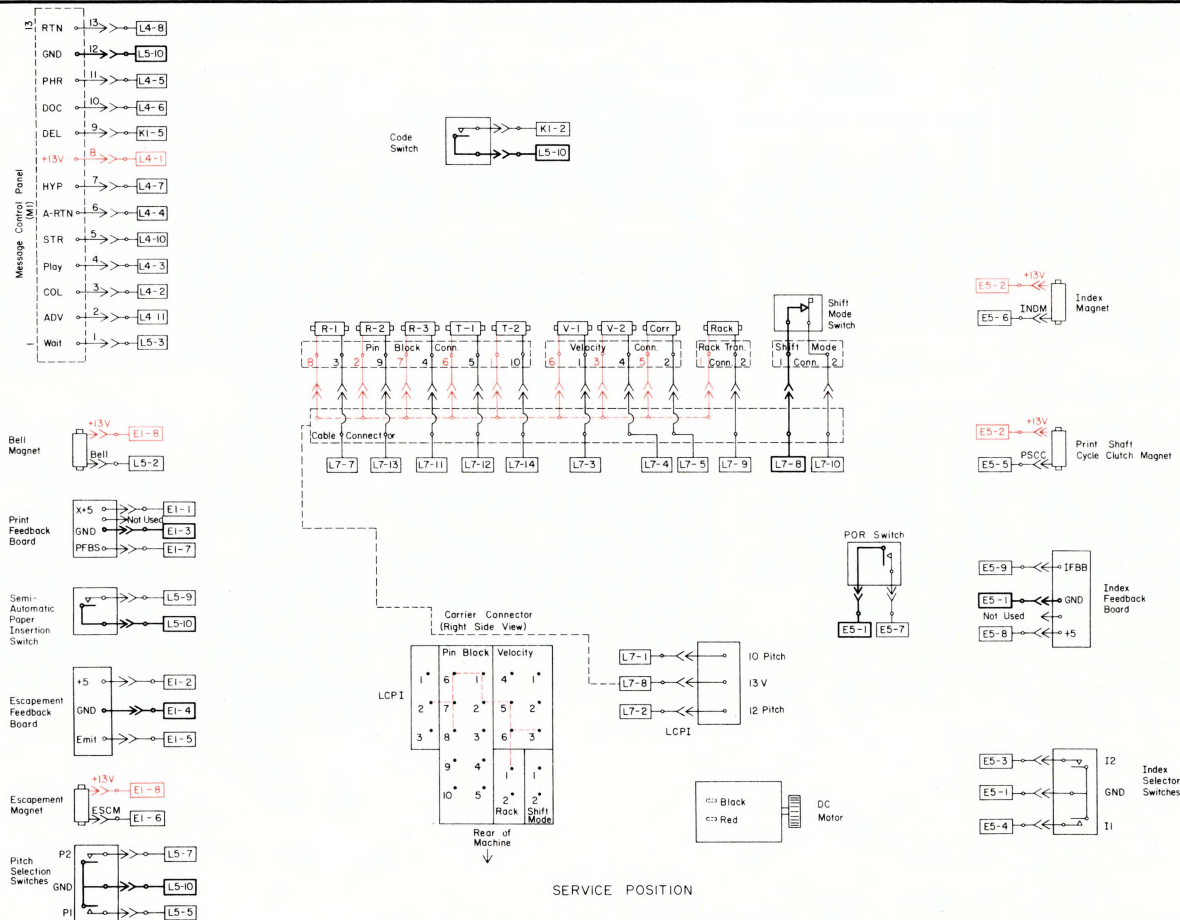
Pin-1					K-2/Pin-8
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Escapement Control Board E-5

Pin-1	POR SW/ Pin-1	Index Select SW1/ Pin-2	Index Select SW2/ Pin-2		Index Feedback Board/ Pin-3
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Escapement Control Board E-1

Pin-3					Print Feedback Board/Pin-2
Pin-4					Escapement Emitter BD/Pin-2



NO. 1 CONNECTOR
EXPANDED MEMORY

NO. 6 CONNECTOR
DRIVER/PROCESSOR BOARD

NO. 10 CONNECTOR
KEYBOARD

NO. 2 CONNECTOR
POWER SUPPLY

NO. 7 CONNECTOR
CARRIER

PIN NO. **NAME** **STATIC** **ACTIVE**

PIN NO.	NAME	STATIC	ACTIVE
10-1	GND	GND	GND
10-2	Reed 1	+5	0
10-3	Reed 4	+5	0
10-4	Reed 2	+5	0
10-5	Reed 5	+5	0
10-6	Reed 3	+5	0
10-7	Reed 6	+5	0
10-8	KBMD	+5 (LC)	0 (UC)

POWER SUPPLY CHECK

1. Check to see that the small lands on the back of the power supply are **NOT** burned out. Lands are connected to the back of the transformer plug.
2. Check the output voltage of the transformer plug (see primary wiring diagram).
3. Turn the main power switch **OFF** for 1 second minimum.
4. Unplug the power supply connector from the driver board.
5. Turn the main power switch **ON** again.
6. Power supply voltages should be:

VOLTAGE CHART

COM Meter Lead Connection	VOM Meter Lead Connection	Voltage Reading
Pin 2/2 or 2-5	Pin 2-1	+13
Pin 2/2 or 2-5	Pin 2-2	GND
Pin 2/2 or 2-5	Pin 2-3	+5
Pin 2/2 or 2-5	Pin 2-4	+5
Pin 2/2 or 2-5	Pin 2-5	GND
Pin 2/2 or 2-5	Pin 2-6	0
Pin 2/2 or 2-5	Pin 2-7	5
Pin 2/2 or 2-5	Pin 2-8	0
Pin 2/2 or 2-5	Pin 2-9	+8.5
Pin 2/2 or 2-5	Pin 2-10	+8.5

PITCH SELECTION

75	P1	P2
10A	0	5
10B	0	0
12A	5	0
12B	5	5

CAUTION: Turn power off before disconnecting a driver board or processor board connection.

All voltages are DC $\pm 10\%$ unless otherwise specified. All static readings are taken with the main power and motor switch on.

*0 For 200 MSEC At Power On

*0 With Motor Switch Off Or Line Voltage Below 90 VAC.

NO. 3 CONNECTOR
NOT USED

NO. 4 CONNECTOR
MESSAGE CONTROL PANEL

PIN NO.	NAME	STATIC	ACTIVE
4-1	+13 V	+13	+13
4-2	COL	+8	0
4-3	PLAY	+5	0
4-4	ARTN	+8	0
4-5	PHR	+8	0
4-6	DOC	+8	0
4-7	HYP	+8	0
4-8	RTN	+5	0
4-9	DEL	+5	0
4-10	STR	+5	0
4-11	ADV	+5	0

NO. 5 CONNECTOR
LEFT CABLE

PIN NO.	NAME	STATIC	ACTIVE
5-1	ESC	+13	0
5-2	BELL	+13	0
5-3	+5 V	+5	+5
5-4	PFB	+5	0
5-5	P1	+	+
5-6	EMIT	+5	0
5-7	GND	GND	GND
5-8	Code (Ahtc)	+5	0
5-9	INSRT	+5	0
5-10	P2	+	+
5-11	+13 V	+13	+13
5-12	GND	GND	GND

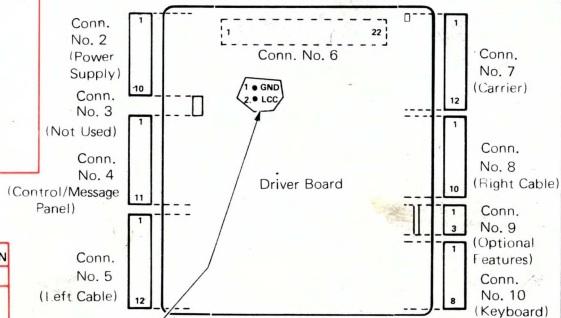
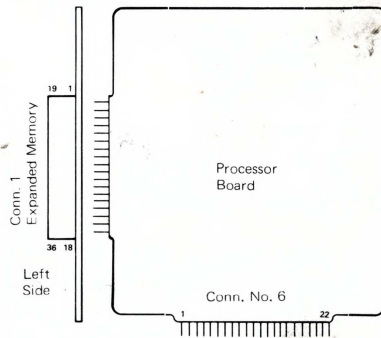
PIN NO.	NAME	STATIC	ACTIVE
7-1	V1	+13	0
7-2	V2	+13	0
7-3	Cor (ER)	+13	0
7-4	+13 V	+13	+13
7-5	R1	+13	0
7-6	GND	GND	GND
7-7	Rack	+13	0
7-8	SHMD (PUC)	+5 (LC)	0 (UC)
7-9	R3	+13	0
7-10	T1	+13	0
7-11	R2	+13	0
7-12	T2	+13	0

NO. 8 CONNECTOR
RIGHT CABLE

PIN NO.	NAME	STATIC	ACTIVE
8-1	Wait (A Off)	+8	0
8-2	SAPI	+13	0
8-3	+13 V	+13	+13
8-4	IND	+13	0
8-5	DRV	+13	0
8-6	REV	+13	0
8-7	HIS	+13	0
8-8	PSCC (CC)	+13	0
8-9	POR (KA)	+5	0
8-10	GND	GND	GND

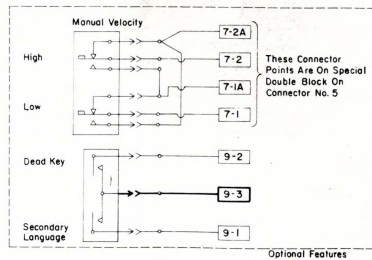
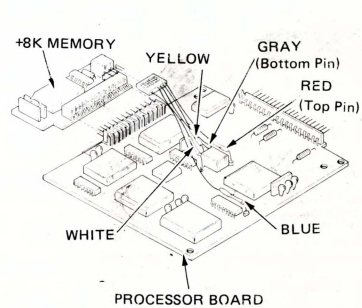
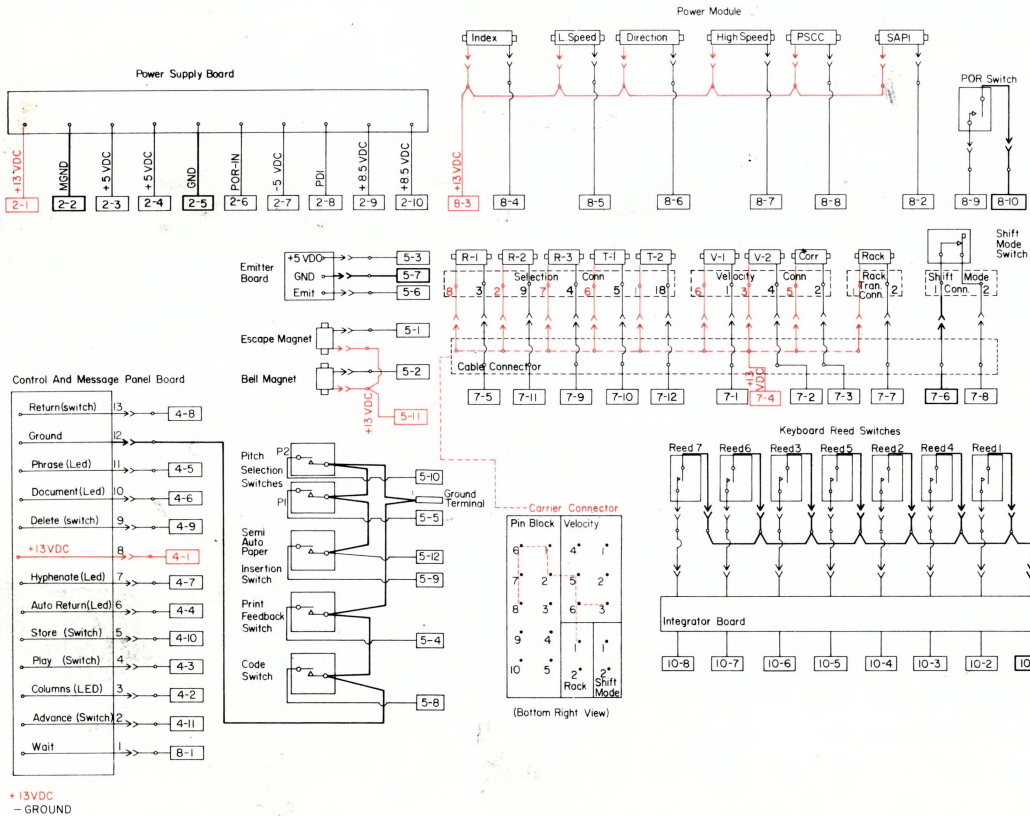
NO. 9 CONNECTOR
OPTIONAL FEATURES

PIN NO.	NAME	STATIC	ACTIVE
9-1	GND	GND	GND
9-2	OK	+5	0
9-3	SL	+5	0



Long Carriage Jumper On
Long Carriage Machines (Top Side Of Board)

CABLE CONNECTOR NUMBERING
(Service Position)



NO. 1 CONNECTOR

LEFT CABLE

PIN NO.	NAME	STATIC	ACTIVE
1-1	Code (Altc)	+5	0
1-2	Bell	+12	0
1-3	PFB	+5	0
1-4	GND	GND	GND
1-5	+5 VDC	+5	+5
1-6	Emit	+5	0
1-7	ESC	+12	0
1-8	Blank	—	—
1-9	P2	†	†
1-10	P1	†	†
1-11	GND	GND	GND
1-12	+12 VDC	+12	+12

NO. 2 CONNECTOR

OPTIONAL FEATURE

PIN NO.	NAME	STATIC	ACTIVE
2.1	GND	GND	GND
2.2	DKC	+5	0
2.3	SLC	+5	0

NO. 3 CONNECTOR

POWER SUPPLY

PIN NO.	NAME	STATIC	ACTIVE
3.1	GND	GND	GND
3.2	GND	GND	GND
3.3	Key	—	—
3.4	+5	+5	+5
3.5	+12	+12	+12
3.6	+12	+12	+12
3.7	-5V	-5V	-5V
3.8	-5V	-5V	-5V

NO. 4 CONNECTOR

RIGHT CABLE

PIN NO.	NAME	STATIC	ACTIVE
4.1	GND	GND	GND
4.2	POR (KA)	+5	0
4.3	PSCC	+12	0
4.4	Hi Speed	+12	0
4.5	REV	+12	0
4.6	FWD*	+12	0
4.7	IND	+12	0
4.8	+12V	+12	+12

All voltages are DC $\pm 10\%$ unless otherwise specified. All static readings are taken with the main power and motor switches on.

CAUTION: Turn power off before disconnecting a logic board connector.

NO. 5 CONNECTOR

CARRIER

PIN NO.	NAME	STATIC	ACTIVE
5.1	V1	+12	0
5.2	V2	+12	0
5.3	Corr	+12	0
5.4	+12	+12	+12
5.5	R1	+12	0
5.6	GND	GND	GND
5.7	Rack	+12	0
5.8	SHMD (PUC)	+5 (LC)	0 (UC)
5.9	R3	+12	0
5.10	T1	+12	0
5.11	R2	+12	0
5.12	T2	+12	0

NO. 6 CONNECTOR

KEYBOARD

PIN NO.	NAME	STATIC	ACTIVE
6.1	KBMD	+5 (LC)	0 (UC)
6.2	Reed 6	+5	0
6.3	Reed 3	+5	0
6.4	Reed 5	+5	0
6.5	Reed 2	+5	0
6.6	Reed 4	+5	0
6.7	Reed 1	+5	0
6.8	GND	GND	GND

NO. 7 CONNECTOR

MODEL 60

PIN NO.	NAME	STATIC	ACTIVE
7.1	Auto Rtn	+5	0
7.2	Delete	+5	0
7.3	Store	+5	0
7.4	Store LED	+11.9	+10

STATIC VOLTAGE CHECK MODEL 50/60

POWER SUPPLY CHECK

- Check to see that the small lands on the back of the power supply are **NOT** burned out. Lands are connected to the back of the transformer plug.
- Check the output voltage of the transformer plug (see primary wiring diagram).
- Turn the main power switch **OFF** for 1 second minimum.
- Unplug the power supply connector from the logic board.
- Short connector pins 3-7 and 3-8 of connector together.
- Turn the main power switch **ON** again.
- Power supply voltages should be:

COM Meter Lead Connection

VOM Meter Lead Connection

Voltage Reading

Pin 3-1 or 3-2
Pin 3-1 or 3-2
Pin 3-1 or 3-2
Pin 3-1 or 3-2

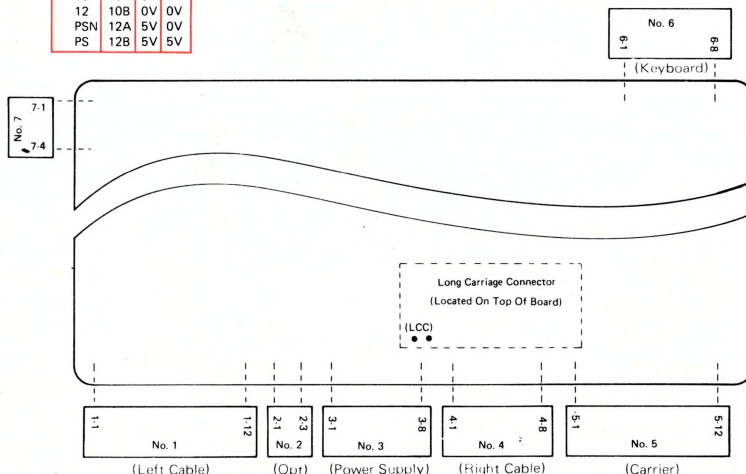
Pin 3.4
Pin 3.5
Pin 3.6
Pin 3.7
Pin 3.8

+5 VDC
+12 VDC
+12 VDC
-5 VDC
-5 VDC

PITCH SELECTION

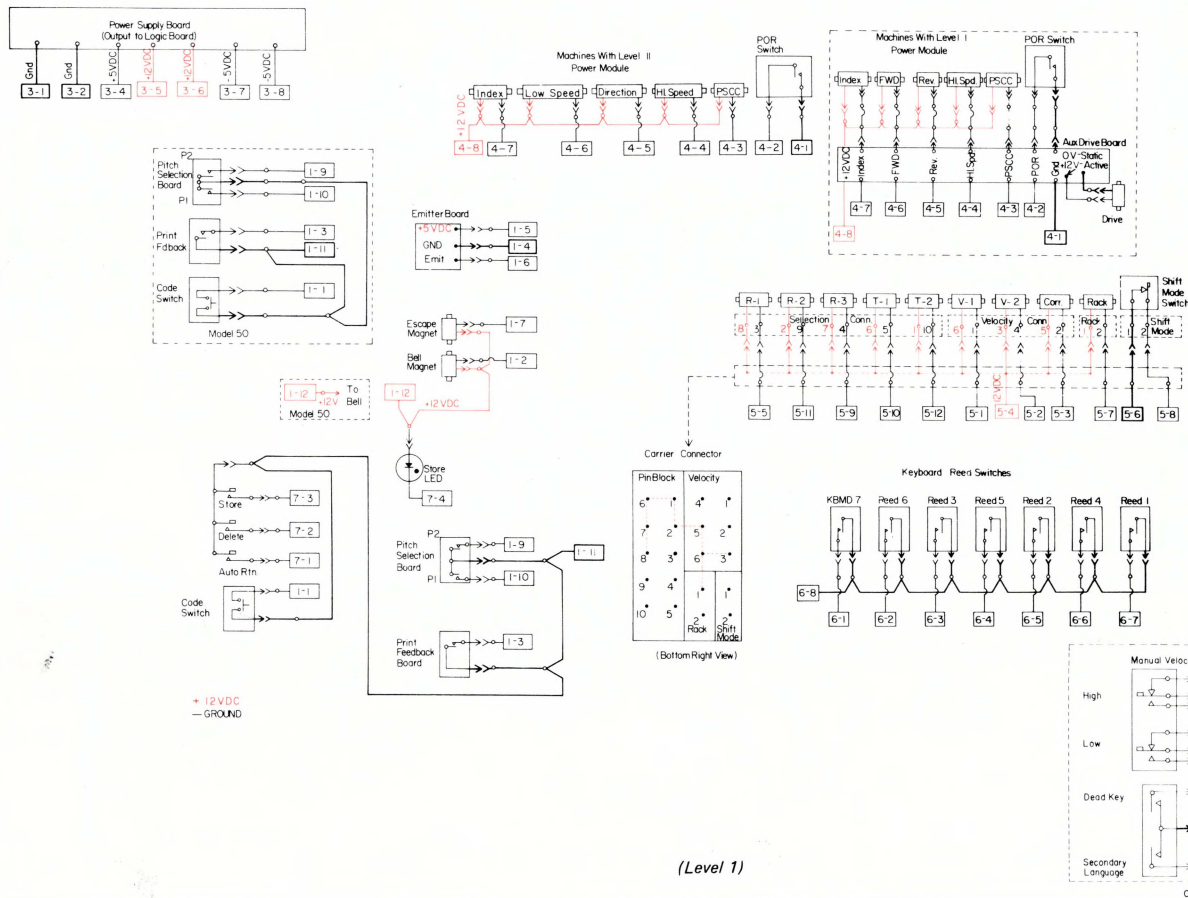
50	60	P1	P2
10	10A	0V	5V
12	10B	0V	0V
PSN	12A	5V	0V
PS	12B	5V	5V

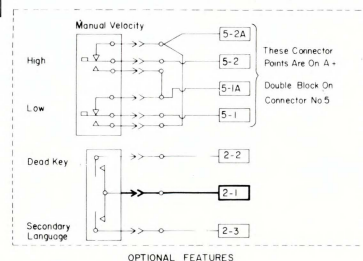
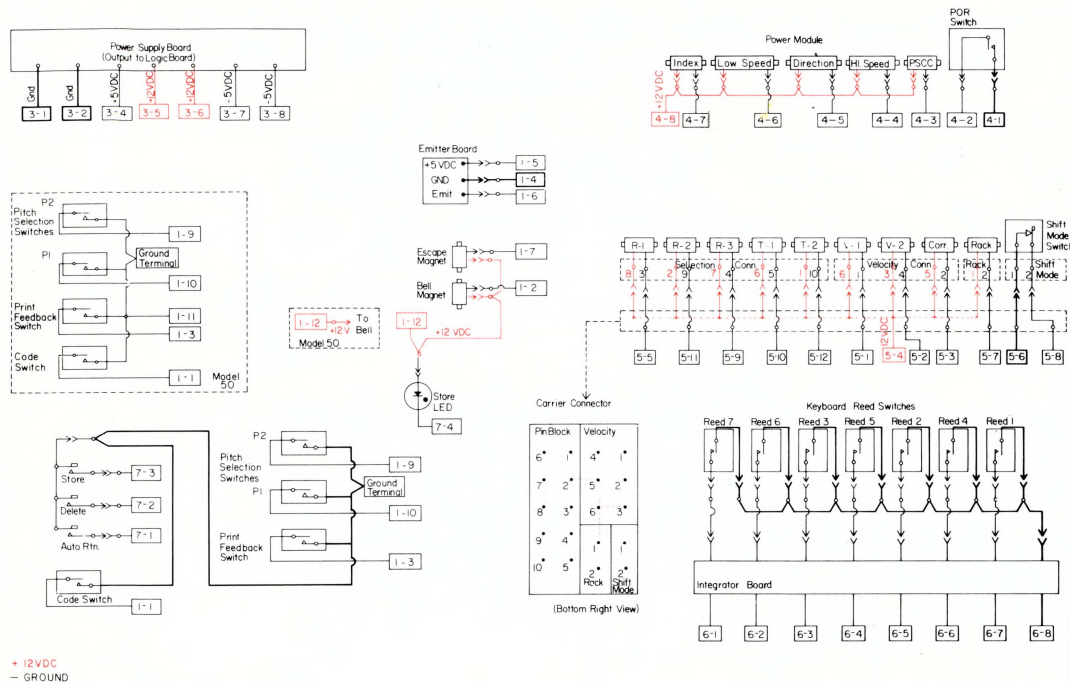
(Model 60)



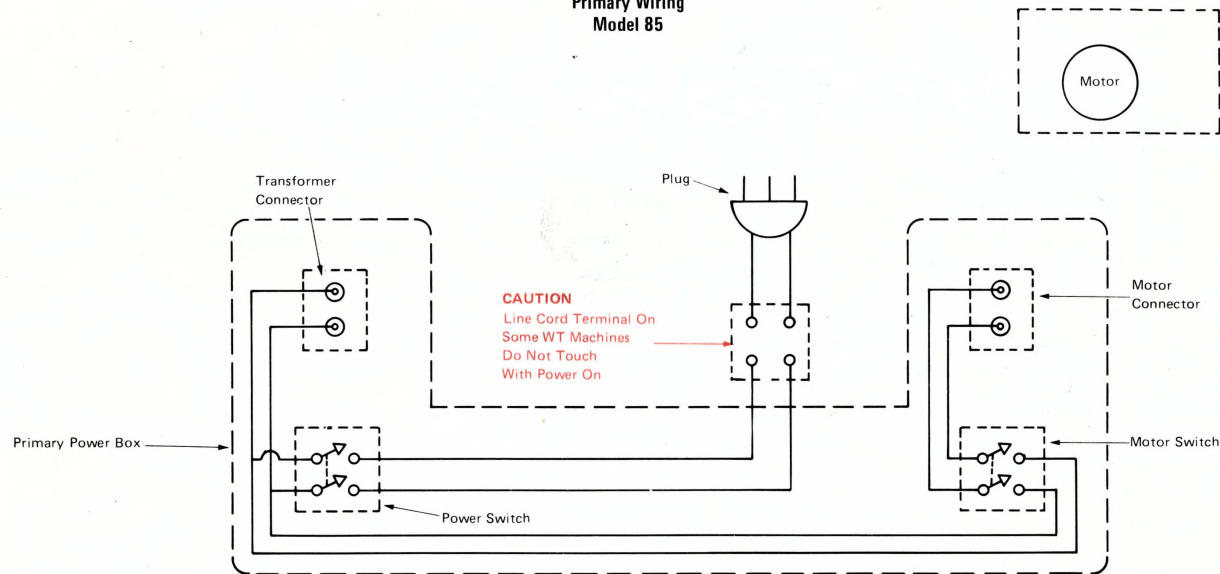
CABLE CONNECTOR NUMBERING
LOGIC BOARD
(Service Position)

* Drive On Machines Without Auxiliary Drive Board



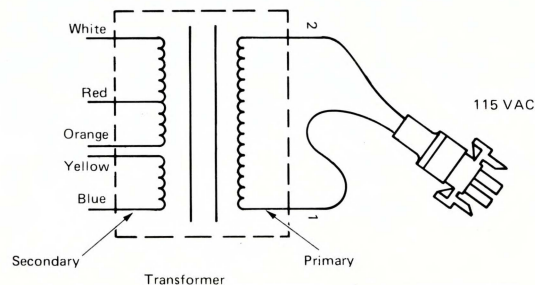


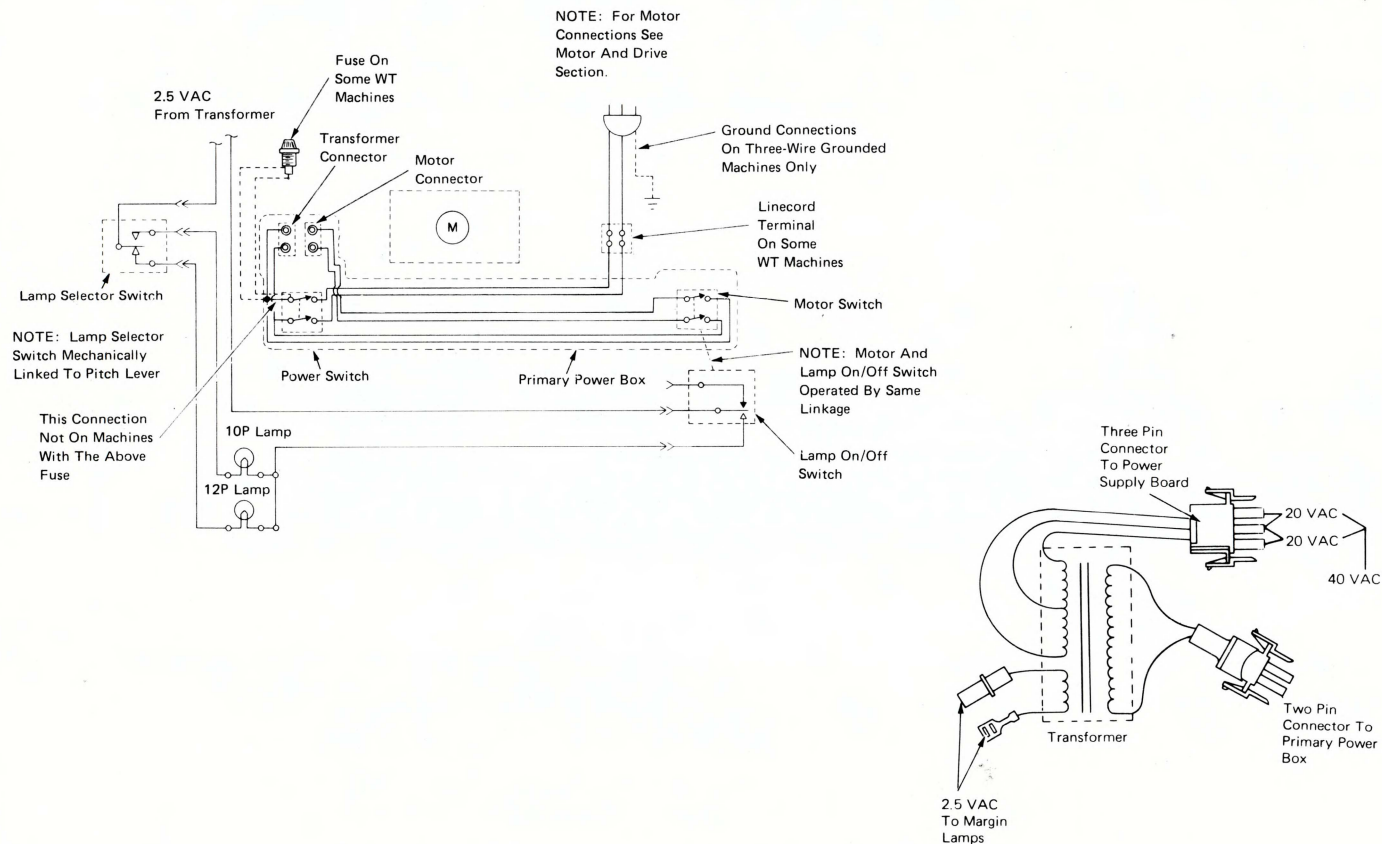
Primary Wiring Model 85



TRANSFORMER OUTPUT VOLTAGES
(All secondary voltage wires from
transformer disconnected.)

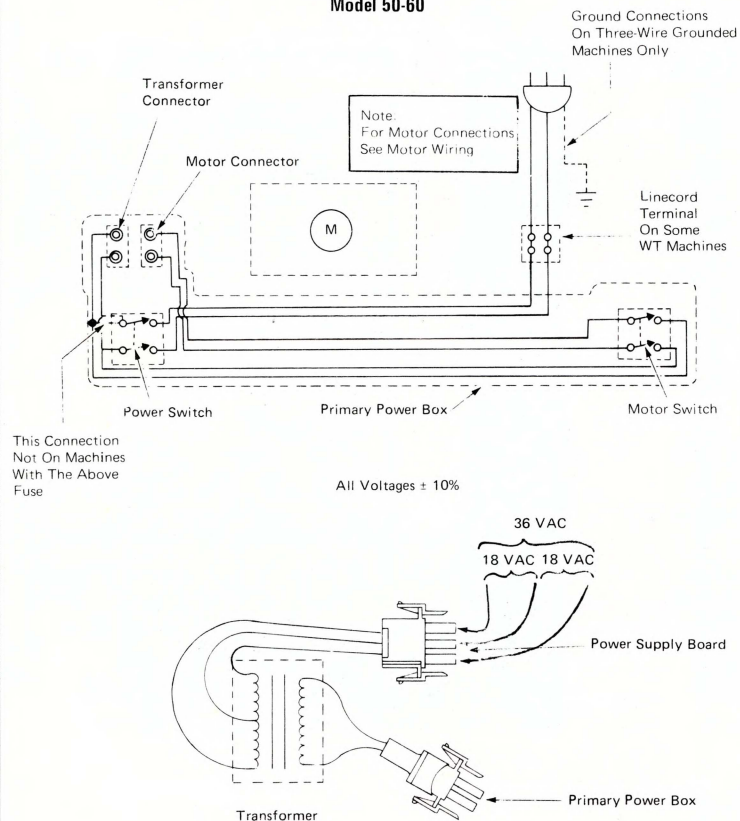
+Meter Lead	-Meter Lead	Static Voltage Range
Blue	Yellow	15-22 VAC
Orange	White	20-30 VAC
Orange	Red	10-15 VAC
White	Red	10-15 VAC



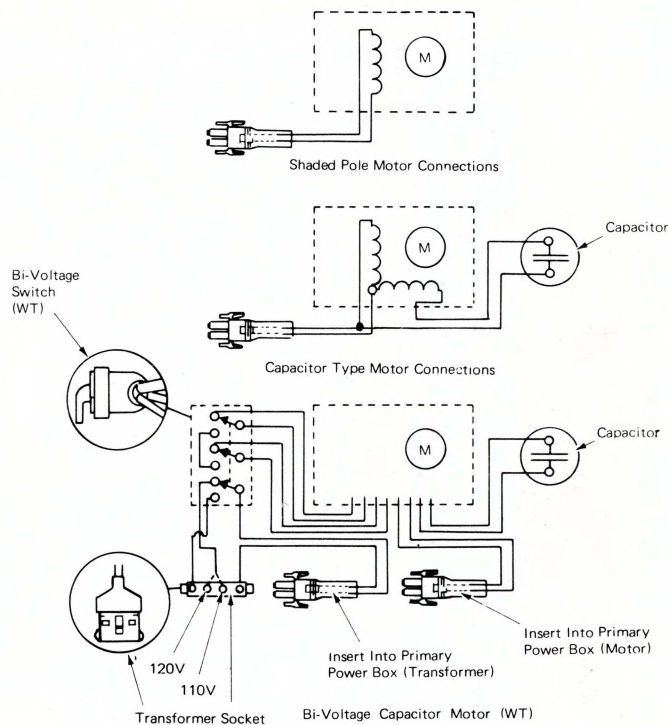


PRIMARY WIRING

Model 50-60



MOTOR WIRING



COMBINATION CHART

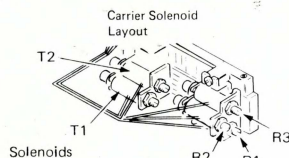
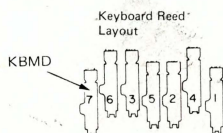
KEYBOARD REEDS ACTIVE	CHARACTER	PRINTER							KEYBOARD	
		SOLENOIDS (ACTIVE)			PINS				DRIVE LINE	SENSE LINE
		ROTATE	TILT	RK	ROT	TIL	VEL			
1 2 5 6	A a	1 2	2	Yes	-2	2	H/M	1	C	
1 2 4 5 6	B b	1 2	1 2	Yes	-2	1	H/H	6	B	
1 4 5 6	C c	1	1 2	Yes	-1	1	H/M	4	B	
1 2 5	D d	1 2	2	No	2	2	H/H	3	C	
2 4 5	E e	0	1 2	No	0	1	H/M	3	D	
1 2 4 6	F f	1 2	1	Yes	-2	3	H/M	4	C	
2 3 4 6	G g	2 3	1	Yes	-4	3	H/H	5	C	
2 3 5 6	H h	2 3	2	Yes	-4	2	H/H	6	C	
1 3 4 5	I i	1 3	1 2	No	3	1	M/M	8	D	
1 2 4 5	J j	1 2	1	No	2	3	M/M	7	C	
1 3 4 5 6	K k	1 3	1 2	Yes	-3	1	H/H	8	C	
1 3 4 6	L l	1 3	1	Yes	-3	3	H/M	9	C	
2 3 5	M m	2 3	2	No	4	2	H/H	8	B	
1 5 6	N n	1	2	Yes	-1	2	H/M	7	B	
1 5	O o	1	2	No	1	2	H/M	9	D	
2 4	P p	0	1	No	0	3	H/H	10	D	
1 4	Q q	1	1	No	1	3	H/H	1	D	
2 5	R r	0	2	No	0	2	H/M	4	D	
1 2 4 5	S s	1 2	1 2	No	2	1	H/M	2	C	
1 4 5	T t	1	1 2	No	1	1	H/M	5	D	
2 3 4 5 6	U u	2 3	1 2	Yes	-4	1	H/H	7	D	
3 5	V v	3	2	No	5	2	H/M	5	B	
1 3 5	W w	1 3	2	No	3	2	H/H	2	D	
1 3 5 6	X x	1 3	2	Yes	-3	2	H/M	3	B	
1 4 6	Y y	1	1	Yes	-1	3	H/H	6	D	
3	Z z	3	0	No	5	0	H/M	2	B	
2 3 4	! 1	2 3	1	No	4	3	L/M	1	E	
1	@ 2	1	0	No	1	0	H/M	2	E	
3 6	= 3	3	0	Yes	-5	0	H/H	3	E	
1 2 6	\$ 4	1 2	0	Yes	-2	0	H/H	4	E	
1 2	% 5	1 2	0	No	2	0	H/H	5	E	
1 6	& 6	1	0	Yes	-1	0	M/H	6	E	
1 3	& 7	1 3	0	No	3	0	H/M	7	E	
1 3 6	* 8	1 3	0	Yes	-3	0	M/H	8	E	
2 3 6	(9	2 3	0	Yes	-4	0	M/H	9	E	
2	) 0	0	0	No	0	0	M/H	10	E	
3 5 6	¼ ½	3	2	Yes	-5	2	H/H	11	D	
3 4	- -	3	1	No	5	3	L/L	11	E	
2 5 6	+ ±	2	2	Yes	-6	2	L/M	0	E	
2 4 5 6	+ =	2	1 2	Yes	-6	1	M/M	12	E	
3 4 6	[]	3	1	Yes	-5	3	M/M	12	D	
3 4 5	; :	3	1 2	No	5	1	L/L	10	C	
2 3 4 5	" "	2 3	1 2	No	4	1	L/L	11	C	
2 3	' `	2 3	0	No	4	0	M/M	12	C	
3 4 5 6	~ ¨	3	1 2	Yes	-5	1	H/H	1*	B*	
2 4 6	. ,	2	1	Yes	-6	3	L/L	9	B	
1 3 4	/	1 3	1	No	3	3	L/L	10	B	
2 6	? /	2	0	Yes	-6	0	M/M	11	B	
5 6	CR	0		No	-	-	-	13	C	
4	Shift LC/LH	2	0	No	6	-	-	0*	B*	
4 6	Shift UC/RH	2	0	No	6	-	-	12	B	
6	Index	0	0	No	-	-	-	14	E	
4 5 6	Backspace	0	0	No	-	-	-	13	E	
4 5	Spacebar	0	0	No	-	-	-	15	B	
5	Tab	0	0	No	-	-	-	0	D	
	Shift Lock							0	C	

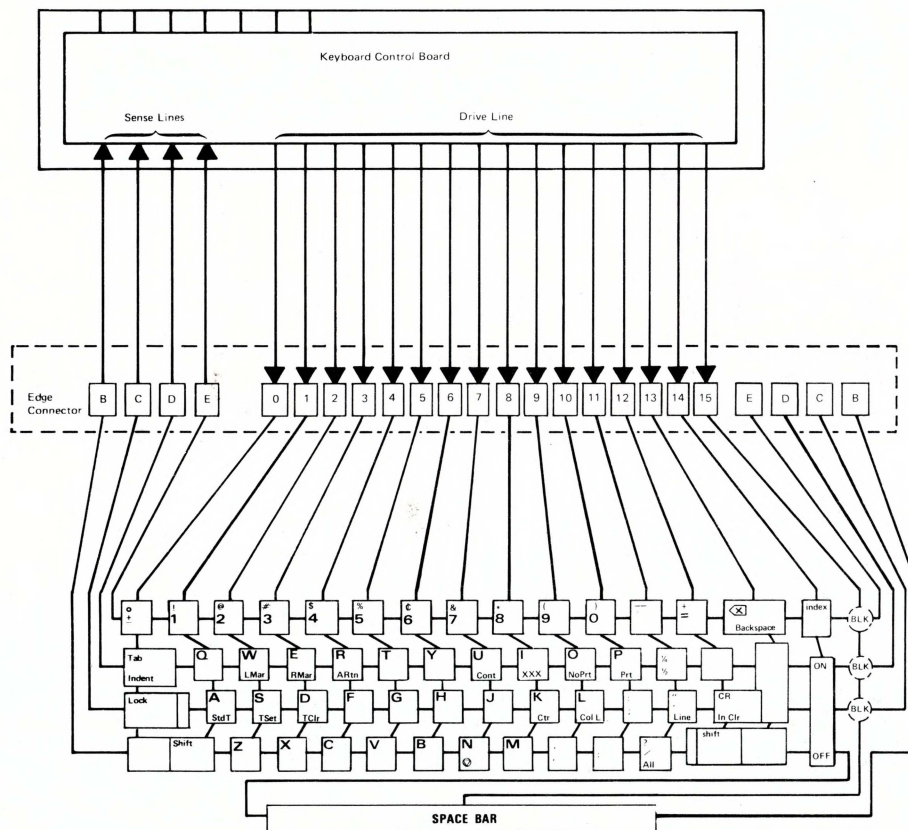
Before adjusting or replacing a component, ensure that the failure has been isolated to the keyboard or printer.

* On 92-character keyboards, the left-hand shift moves to the B1 position.

VELOCITY MAGNET CHART

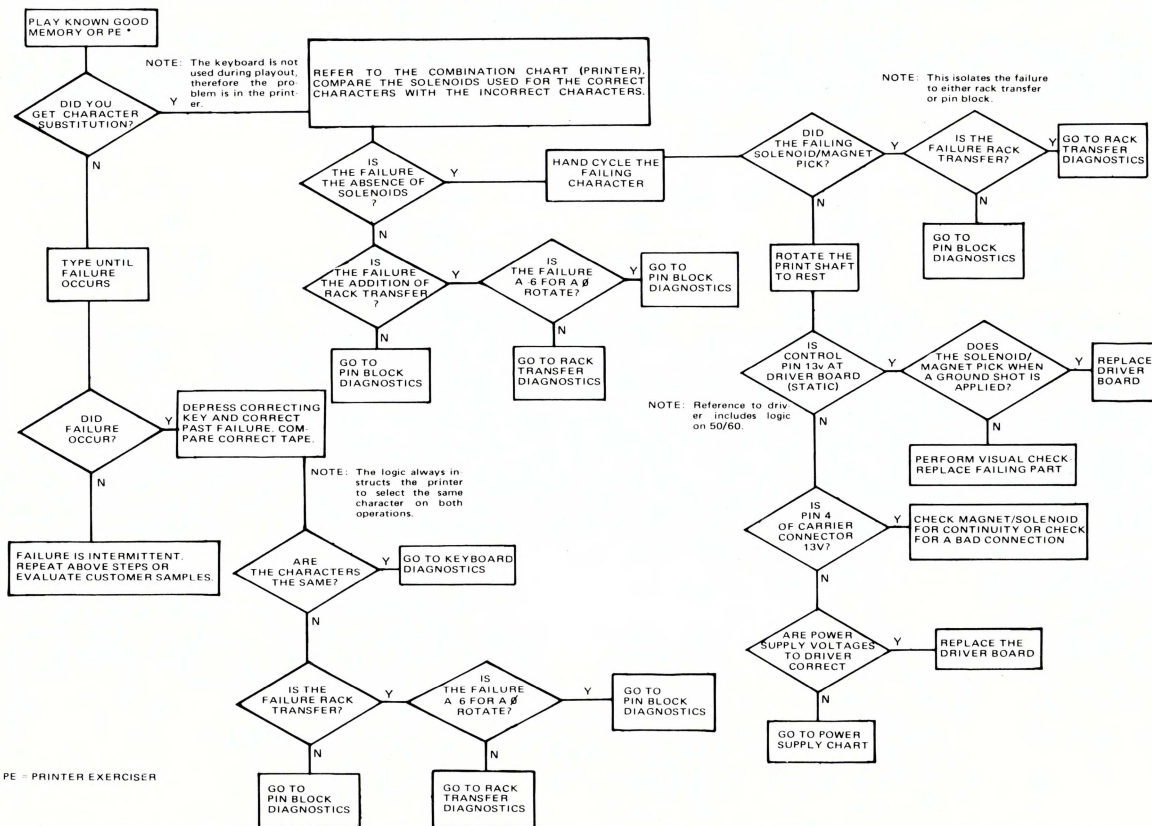
VELOCITY	MAGNETS ENERGIZED
No Print	None
Low Velocity	V-2 (Lower Magnet)
Medium Velocity	V-1 and V-2
High Velocity	V-1 (Upper Magnet)
Correction	Center Magnet (Level 1)





FAILURE	BY SYMPTOM	DIAGNOSTIC
CARRIER		
Broken cams		Broken Cam
Character substitution		Character Substitution Isolation
Correction failures		Correction Failures
Missing characters		Poor Print Quality And Velocity
Shift failures		Shift Failure
Split characters		Worn Typehead
Worn tooth on typehead		Worn Typehead
CORRECTION FAILURES		
Grey characters		Correction Failures
Lift off incomplete left to right		Correction Failures
Lift off incomplete up and down		Correction Failures
No tape lift or feed		Correction Failures
Unwanted corrections		Correction Failures
ESCAPEMENT		
Carrier drives to right frame		Escapement
Carrier stuck at right frame		Escapement
Crowding characters		Escapement
Extra units		Escapement
Margin drifts left		Escapement
Margin drifts right		Escapement
POR failures		POR
System busy		System Busy
Unwanted pitch change		POR
Unwanted POR		POR
INDEX		
Index rolls down		Index
Index rolls up		Index
No index		Index
Unwanted carrier return/no index		POR
Unwanted index		Index
KEYBOARD		
Adding switches		Keyboard
Losing switches		Keyboard
NOISE		
Idle		Noise
Typing		Noise

FAILURE	BY SYMPTOM	DIAGNOSTIC
POOR PRINT		
Dark characters		Poor Print And Velocity
Light characters		Poor Print And Velocity
Missing characters		Poor Print And Velocity
Ragged underscore		Poor Print And Velocity
Unwanted velocity		Poor Print And Velocity
POR		
Carrier drives to right frame		POR
Unwanted pitch change		POR
Unwanted POR		POR
SHIFT FAILURES		
"Hunts"		Shift Failure
Prints out-of-case/no character sub.		Shift Failure
Prints out-of-case/w character sub.		Character Substitution Isolation
SYSTEM BUSY		
All message panel lights on		System Busy
Escapement		System Busy
Motor reset ok/will not type		System Busy
No motor reset		System Busy
WAIT light on		System Busy
VELOCITY		
Dark characters		Poor Print Quality And Velocity
Light characters		Poor Print Quality And Velocity
Missing characters		Poor Print Quality And Velocity
Ragged underscore		Poor Print Quality And Velocity
Unwanted velocity		Poor Print Quality And Velocity



• PE = PRINTER EXERCISER

Pinblock failures are defined as the failure to drop the required pin. Make sure the following conditions exist before proceeding:

Rotate rack and pinion timing marks are aligned.

Typehead is homed.

Tilt cam follower is not broken.

Tilt and rotate cams are not broken (see Broken Cam Diagnostics).

Symptom	Reason for failure	Repair actions
No pin or wrong pin drops	Sticking, binding, or malfunctioning solenoids allow the wrong pin or no pin to fall. Failure of pins to align with the restoring track and erratic drive of the printshaft can cause the pins and vanes to bounce causing this failure. A pinblock adjusted too close to the rotate cam (less than .006") allows excessive restoring motion of the pins causing the wrong pin to drop. A pinblock adjusted too far from the rotate cam (more than .009") may not allow the pin to restore.	A. Check for binding plunger/vane. B. Check selection cams for wear. C. Check for weak pin spring in pinblock. D. Check/adjust Character Selection adjustments from Rotate Rack Plate Home Position thru Selection Solenoid Airgap. Before replacing the pinblock check Print Shaft Drive Diagnostics.

By examining the broken cams for wear and observing the location of the break, you can determine the actual cause of the break. The two primary reasons for cam breakage are a pin entering the wrong track or the rotate rack failing to transfer properly.

Symptom

Reason for failure

Repair actions

Rack Fails To Transfer Properly

1) Home Position

Break in left
side of rotate
cam follower track



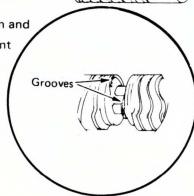
2) Shift Position

Groove

Break in right side of cam
follower track.

3) Home Position and
Grooves Present

Grooves



If the rotate rack fails to transfer fully, the rotate pinion will be engaged with both the positive and negative teeth of the rotate rack. The rack movement will stop and result in cam breakage as the cams continue to move laterally. See CEM 261 for information regarding .015" additional motion of negative follower. Problems can be caused by a bent selection cam follower. If pinblock pin alignment and adjustment is correct, and the rack followers do not track properly on the cams, a bent selection cam follower is possible.

- A. Check for a bent cam follower. (Replace rotate rack plate.)
- B. Check/adjust Character Selection adjustments from Rotate Shaft End Play thru Tilt Bellcrank Stop.

Pin Entering The Wrong Track

May break here
or here.



selection pin normally is released while the restore surfaces of the selection pins are contacting the pins. Any pin that is released after the restore surfaces have passed the pins can enter a wrong track.

- A. Check/adjust Character Selection adjustments from Pin block thru Tilt Bellcrank Stop.
- B. Before replacing the pinblock check Print Shaft Drive Diagnostics.

The position of the rotate rack front to rear determines which direction the typehead will rotate. The rack is positioned very early in the print shaft cycle (before the selection cams move laterally). Timing and mechanical adjustments are critical and **will** cause failures if not correct. The rack transfer solenoid is energized for all negative characters and must operate in less than 10 milliseconds. A binding or sticking solenoid plunger will cause failures.

Symptom	Example	Reason for failure	Repair actions
Intermittent positive for negative character.	O for N D for A T for C	The negative follower (tilt cam) is not transferring the rack. The solenoid may energize too slowly or enough motion is not available to transfer the rack. See CEM 261 for information regarding .015" additional motion of negative follower. Timing or related parts may be maladjusted.	A. Worn selection cams. B. Shim under bail shaft support or .015" motion. C. Print shaft timing. D. Check/adjust Character Selection adjustments from Selection Cams (Fine Timing) thru Tilt Bellcrank Stop. E. Before replacing rack transfer assembly check Print Shaft Drive Diagnostic.
Intermittent negative for positive character.	N for O A for D C for T	The positive follower (rotate cam) is not transferring the rack. The solenoid may de-energize too slowly. The negative follower may be in the path of the plunger. Problems can be caused by a bent selection cam follower. If pinblock pin alignment and adjustment is correct, and the rack followers do not track properly on the cams, then a bent selection cam follower is possible.	A. Bent selection cam follower. B. Check/adjust Character Selection adjustments from Selection Cams (Fine Timing) thru Tilt Bellcrank Stop. C. Before replacing rack transfer assembly check Print Shaft Drive Diagnostics.
Rack fails to transfer.	Types only positive or neg. char.	Followers are not transferring the rack because of broken parts or parts not aligning. If only positive characters are selected check the solenoid and wiring for failure.	A. Broken follower(s). B. Follower restore (hair-pin) spring off or broke. C. Binding plunger. D. Wiring. E. Replace rack transfer.

There are two different symptoms which can have the same cause. Too much typehead drive causes the typehead to rotate slightly beyond the selected character under **dynamic** conditions. The rotate detent then enters near the tip of the tooth and moves to the top of the notch, locking the typehead in place. In time the tooth will wear. Wear is most apparent in the rotate 6 band because the typehead detents at this point every shift cycle. Splitting characters is another symptom of improper typehead drive. Most split characters are the **result of overdrive**. If the typehead rotates beyond the selected character, the rotate detent may not be able to lock the typehead into place before print occurs. The result is a split character. This type of split character occurs most often in the +3 or +4 rotate bands.

Symptom	Reason for failure	Repair actions
Sample of Worn Typehead 	Excess typehead drive.	A. Check/adjust the Character Selection adjustment from Rotate Rack Plate Home thru Tilt Bellcrank Stop. B. Check Print Shaft Drive Diagnostics.
Split characters. M1 MMM MM	Excess typehead drive. Rotate detent not seating. Erratic typehead drive caused by erratic print shaft drive.	A. Check/adjust the Character Selection adjustments from Rotate Rack Plate Home thru Tilt Bellcrank Stop. B. Check/adjust the Fine Alignment adjustments from Rocker End Play thru Detent Cam. C. Check Print Shaft Drive Diagnostics.

Before diagnosing the cause of characters printing too light or too dark, you must determine if the velocity cam follower roller tracked on the proper velocity cam. Type the failing character and observe the grease track on the velocity cams. Determine whether the roller is tracking on the proper cam surface. (NOTE: High=Left, Low=Center, Medium=Right.)

Symptom		Reason for failure	Repair actions
Light characters or voids.	roller on wrong cam	Velocity slider is not in proper position. Low or med. velocity was applied for high. Low velocity was applied for medium.	A. Check electrical connections. B. Worn or binding velocity slider (replace). C. Check/adjust Print adjustments from Print Shaft Timing thru Velocity Cam Follower.
	roller on proper cam	Rocker flight was inhibited. Typehead over striking on ribbon. (Ribbon-feed failure.) Ribbon/paper not compatible.	A. Check/adjust Print adjustments from Velocity Cam Follower thru Yoke. A. Check Ribbon Adjustments. A. Supplies/application.
Dark characters or embossing.	roller on wrong cam	Velocity slider is not in proper position. High velocity was applied for low or medium.	A. Check electrical connections. B. Worn or binding velocity slider (replace). C. Check/adjust Print adjustments from Velocity Magnet Assembly thru Velocity Cam Follower.
	roller on proper cam	Excessive typehead impact.	A. Check/adjust Print adjustments from Velocity Cam Follower thru Powered And Free Flight. B. Check Print Shaft Drive Diagnostics.
Unwanted Velocity Examples: Shift zero0between		The center armature did not hold the slider during a no-print print shaft rotation. (Tab, shift, spacebar, carrier return, backspace, or index.)	A. Worn or binding velocity slider (replace). B. Check/adjust Print adjustments from Velocity Magnet Assembly thru Velocity Cam Follower. C. Check for electrical component contamination.

Symptom	Reason for failure	Repair actions
Ragged Underscore	The tilt detent is not seating. Fine alignment mechanism is not holding the typehead securely. The paper is not tight against the platen.	A. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Leadscrew Lock. B. Tilt Ring Position adjustment. C. Tilt Bellcrank Stop adjust. D. Check/adjust Print adjustments from Velocity Cam Follower thru Yoke.
A missing character is the absence of velocity (no impression on the page). For example, you type the letters ABC but on the paper you see A C. If there is impression but no ink, either an unwanted correction tape lift occurred or the ribbon lift failed. This diagnostic should only be used when there is no impression.		
Missing Characters.	A malfunction in the velocity assembly can prevent a print operation. An extra cycle of the print shaft cycle clutch reduces the time available for the velocity armatures to operate.	A. Check carrier cable/wiring. B. Check/adjust Print adjustments from Velocity Magnet Assembly thru Velocity Cam Follower. A. Check Print Shaft Drive Diagnostics.

Characters which print out of case can be caused by either keyboard or printer failures. **Keyboard failures will correct.** This can be caused by a maladjusted lowercase keylever screw or a maladjusted/worn/open/shorted #7 reed switch. A complete printer shift operation consists of a +6 selection resulting in a change of the shift mode switch (open or closed). **Printer failures** are generally rack transfer, pinblock, or shift mode switch and **will not correct.**

Symptom	Reason for failure	Repair actions
Prints out of case with character substitution.	Printer failure (pinblock, rack transfer or print shaft drive) which is causing both shift failures and character substitution (the shift mode switch will not cause character substitution).	Go to Character Substitution Isolation Diagnostic
Model 50/60 "hunts" A. Print shaft cycles continuously and typehead rotates 360°.	A shift is actually occurring, but the shift mode switch is not informing the logic of the proper case.	A. Check wiring. B. Adjust/replace Shift Mode
B. Print shaft cycles continuously and typehead rotates 90°.	The rotate rack either failed to start the shift operation on the positive rack or failed to transfer to the negative rack at half cycle.	A. Check/adjust Character Selection adjustments from Rack Transfer Detent Springs thru Tilt Bellcrank Stop. B. Before replacing rack transfer check Print Shaft Drive Diagnostics.
C. Print shaft cycles continuously and typehead does not rotate.	Pin 6 failing to drop or parts are loose or broken. If no loose or broken parts are found and all pinblock adjustments are correct check Print Shaft Drive Diagnostics. Erratic drive from the print shaft can cause the pins and vanes to bounce and not allow the R6 pin to drop.	A. Check/adjust Character Selection adjustments from Pin Block thru Selection Solenoid Airgap.
Model 75 prints out of case with no character substitution. Model 50/60 print shaft cycles at least twice before typehead shifts.	One of three failures occurred. Either 1. the shift mode switch case does not match the printer case, 2. pin 6 in the pinblock is intermittently failing to drop, or 3. the rotate rack failed to start the operation from the positive side of the rack or transfer to the negative side at half cycle.	A. (Model 75 only) Adjust/replace the shift mode switch. B. Check/adjust Character Selection adjustments from Pin Block thru Selection Solenoid Airgap. C. Before replacing the rack transfer, pinblock, or rotate cam check Print Shaft Drive Diagnostics.

To ensure complete lift-off, the proper sequence of operations must occur. On the first print shaft cycle the carrier backspaces (low speed reverse) one character space. On the second print shaft cycle the correction tape begins to lift and feed as the character is selected. At the same time, low speed forward drive is applied to the leadscrew, just as it is every print cycle. To complete the second print shaft cycle the tape lifts, the typehead detents, and the typehead hits the tape and paper with proper velocity. When a correction failure occurs, evaluate the sample and use this diagnostic to determine which of the above operations failed.

Symptom	Reason for failure	Repair actions
Lift off is out of alignment at least one unit. 	Carrier did not backspace to the proper place. This is an escapement failure and not a correction failure. The failure could appear on either the left or right side of the character.	See Escapement Diagnostics (Extra units)
Lift off is incomplete only on right side. (Less than one unit) 	Low speed forward is applied to the leadscrew to bias the carrier to the right, removing the play in the escapement mechanism, thereby ensuring constant alignment. For this failure the carrier was not biased properly during print and/or correction.	A. Check/adjust Leadscrew Drive adjustments from Upper Shaft thru Drive Magnet. B. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Leadscrew Lock. C. Check/adjust Escapement adjustments from Leadscrew End Clearance thru Emitter Bracket. D. Replace worn parts.
Lift off is incomplete on left or right side by less than one unit. 	Typehead did not align properly horizontally during print and/or correction. This problem can also be caused by erratic print shaft drive. If all adjustments have not corrected the failure then replace the tilt ring and dogbone.	A. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Leadscrew Lock. B. Check/adjust Print adjustments from Velocity Cam Follower thru Powered And Free Flight. C. Check/adjust Escapement adjustments from Leadscrew End Clearance thru Emitter Bracket. D. Check Print Shaft Drive Diagnostics.
Lift off is incomplete up and down and correction tape has lifted properly. 	Typehead did not align properly vertically during print and/or correction or the paper shifted position.	A. Check/adjust Print adjustments from Platen Latches thru Platen Height. B. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Leadscrew Lock. C. Check/adjust Tilt Ring Position and Tilt Bellcrank Stop.

Symptom	Reason for failure	Repair action
All or portion of character did not correct. Look at correct tape to ensure that tape feed occurred. If feed did not occur see next symptom.	The correcting tape failed to lift, failed to lift high enough, or may have lifted too high. The symptom is the same for both the Ribbon Cassette System (RCS) and the Selective Ribbon System (SRS). Tape sticks to cardholder (SRS).	RCS A. Check/adjust Ribbon Cassette System adjustments from Tape Feed Cam Follower thru Tape Lift Feed Cam. B. Install upstop pad. SRS A. Check/adjust Correcting Tape from Correcting Control Shaft thru High Bias Spring. B. Replace cardholder.
No tape lift or feed.	The correction mechanism failed to unlatch. This failure can also be caused by erratic drive from the print shaft.	RCS A. Check/adjust Ribbon Cassette System adjustments from Tape Feed Cam Follower thru Correcting Control Arm. SRS A. Check/adjust Correcting Tape from Correcting Control Shaft thru Lift Arm Latch. RCS and SRS A. Check Print Shaft Drive Diagnostics.
Grey Characters.	Ink from the ribbon remains on the paper after correction. Alignment is ok but all ink is not removed. This problem could be paper and ribbon are not compatible. Observation of the correction tape shows the tape has not advanced from last correction.	A. Check/adjust Print adjustments from Velocity Cam Follower thru Powered And Free Flight. B. Supplies/applications. A. Check/adjust Tape Feed adjust. B. Replace worn feed ratchet.
Unwanted Corrections	The Correction mechanism was activated either electrically or mechanically.	A. Check for electrical component contamination. B. RCS Check/adjust Correcting Latch Assembly, Tape Feed Cam Follower, Correcting Latch Height, Correcting Control Arm, and Tape Lift Feed Cam. C. SRS Check/adjust Correcting Tape from Correcting Restore Cam thru Tape Lift Arm Lug and Lift Arm Latch.

Keyboard substitution is the incorrect reed switch code being sent to the logic. Since the incorrect code is in the logic the carrier will print and correct this incorrect code. The keyboard is not used during playback or printer exerciser. For this reason if a failure occurs during printer exerciser the failure cannot be a keyboard failure.

Symptom	Reason for failure	Repair actions
Adding switches.	Adding switches can be caused by bridging (more than one interposer driven by the filter bail at the same time) or extra cycles of the keyboard clutch. If any wear is found in the mechanism the worn parts should be replaced before proceeding.	A. Check/adjust Keyboard Drive clutch adjustments from Keyboard Clutch Arbor thru Keyboard Drive Cam Follower. B. Check/adjust keyboard adjustments from Compensator Tube thru Keyboard Bottom Section and from Reed Switch Modules thru Release Bracket.
Losing switches.	Losing switches can be caused by wear in any component in the bottom pan assembly. The switch code can be altered by extra cycles or erratic drive of the keyboard cycle clutch. Also, an integrator board failure can appear to be the loss of switches.	A. Check/adjust Keyboard Drive Clutch adjustments from Keyboard Clutch Arbor thru Keyboard Drive Cam Follower. B. Check/adjust Keyboard adjustments from Compensator Tube thru Keyboard Bottom Section and from Reed Switch Modules thru Release Bracket.

A machine that is functioning properly has the Escapement mechanism, the Leadscrew Drive (Power Module), and the Carrier working together to provide smooth even escapement. When one of these areas develops a problem, then an escapement failure occurs. An escapement failure is defined as the physical position of the carrier getting "out of sync" with the logic escapement counter. When trouble-shooting an escapement failure be sure to include all three areas, even if you find the failure in the first area that you look at. A check of all three areas in relation to each other **cannot** be over stressed.

Symptom	Reason for failure	Repair actions
Extra units/margin drifts right.	Extra units is the mechanical addition of units to the physical position of the carrier. This allows the carrier position to appear to drift to the right. This is caused by the escapement pawl dropping too slow (magnet drops slow) or the inhibitor adjusted too far to the rear allowing them to enter the wrong emitter ratchet tooth.	A. Check/adjust Escapement adjustments from Leadscrew End Clearance thru Emitter Bracket. B. Check/adjust Leadscrew Belt. C. Lubricate per specifications.
Crowding/margin drifts left.	Crowding is the mechanical subtraction of units from the physical position of the carrier. This allows the carrier position to appear to drift left. This is caused by the escapement pawl dropping too soon (bad seal or bad hold force) or the inhibitor adjusted too far to the front allowing them to enter the wrong emitter ratchet tooth.	A. Check/adjust Leadscrew Drive adjustments from Upper Shaft thru Drive Magnet. B. Check/adjust Escapement adjustments from Leadscrew End Clearance thru Emitter Bracket. C. Ensure torsion spring is installed. CEM 263
Crowding/no margin drift.	Crowding with no margin drift occurs when the carrier movement is not complete before the end of an escapement cycle (85° of the next print shaft cycle). This is usually caused by binds in the carrier transport or weak leadscrew drive.	A. Check/adjust Leadscrew Drive adjustments from Upper Shaft thru Drive Magnet. B. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Rear Carrier Shoe. C. Check/adjust Escapement adjustments from Leadscrew End Clearance thru Emitter Bracket. D. Lubricate per specifications. E. Ensure torsion spring is installed. CEM 263
Margin drifts right during Tab. Margin drifts left during Carrier Return.	Both symptoms occur because the escapement pawl does not drop into the emitter ratchet tooth quick enough. This is caused by a bind in the escapement mechanism or poor deceleration from the power module.	A. Check/adjust Leadscrew Drive adjustments from Upper Shaft thru Drive Magnet. B. Check/adjust Escapement Adjustments from Leadscrew End Clearance thru Emitter Bracket. C. Lubricate per specifications.

Symptom	Reason for failure	Repair actions
Drives into right side frame while typing.	This failure occurs when the machine does not complete a POR to the left side frame before driving to the left margin. After making the suggested Repair Actions if failure still occurs, check the Repair Action for Extra units/margin drifts right.	A. Adjust Leadscrew Stop. B. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Rear Carrier Shoe. C. Check/adjust Leadscrew Nut.
Carrier stuck at right side frame.	This failure is usually caused by the leadscrew nut binding the leadscrew or the carrier buffers out of adjustment.	A. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Rear Carrier Shoe. B. Check/adjust Leadscrew Nut. C. See POR Diagnostics.

Index failures can be divided into three categories: No index, rolling index, and unwanted index. After the problem is isolated ensure all adjustments are to specifications.

Symptom	Reason for failure	Repair actions
Unwanted return with no index.	If the operator did not enter a carrier return, what appears to be a carrier return with no index may be an unwanted POR (mod 50/60) or a pitch change (mod 50/60/75).	Refer to POR Diagnostics.
No index.	This is a failure of 1. the index magnet to energize, 2. the drive pawl to engage the drive surface of the driven gear, or 3. broken or out of alignment parts.	A. Check wiring. B. Make sure belt guard does not interfere with index pawl. C. Check for disconnected or broken parts. D. Check/adjust Index adjustments from Index Driven Gear thru Index Timing.
Index rolls downhill. NNNNNNNNNN	The index drive pawl did not engage the driven gear on the first print shaft cycle or there was not enough index drive.	A. Check/adjust Index adjustments from Index Driven Gear thru Pawl Guide. B. Make sure multiplying stop is biased down. C. Check/adjust Feed Roll Tension.
Index rolls uphill. NNNNNNNNNN	The platen kept rotating after the index pawl contacted the stop. This problem is most apparent with 19" machines. This problem can also be caused by too much index drive (link).	A. Check/adjust Index adjustments from Index Driven Gear thru Pawl Guide. B. Make sure multiplying stop is biased down. C. Check/adjust Feed Roll Tension.
Unwanted index. The quick brown	The index pawl released. With the print shaft cycling during the typing operation, the print shaft gear drove the index driven gear to complete the index operation in mid sentence.	A. Check/adjust Index adjustments from Index Driven Gear thru Pawl Guide. B. Make sure multiplying stop is biased down.

The Print Shaft Cycle Clutch (PSCC) must supply reliable drive thru the print shaft to the index, carrier, PFB, and escapement mechanisms. When trouble shooting any failing mechanism that receives drive from the print shaft, do not overlook PSCC drive as a contributor to the failure. The following diagnostic will deal specifically with PSCC drive and Print Feed Back (PFB) because of the close relationship of these two particular mechanisms with the timing of the machine.

Symptom	Reason for failure	Repair actions
Extra cycles of the PSCC	An extra cycle of the PSCC occurs when the PSCC fails to latch (stop driving) at the end of a cycle and continues to drive the print shaft into another cycle. Extra cycles of the PSCC do not usually cause a failure when in "repeat speed" such as payout. This is because at 300° of PFB the PSCC magnet is energized for the next operation. However, during typing, where the PSCC must latch every cycle, a failure may occur as a result of the extra cycle. If the PSCC fails to latch during typing the print shaft will rotate past zero (rest). The logic does not know that the print shaft is rotating until the PFB closes at 85°. If the next character is typed after 85° the logic will hold that character until the PFB opens at 300°. However, if the next character is typed before 85° a failure of the selection of that character may result.	A. Check/adjust Print Shaft Cycle Clutch adjustments from Cycle Clutch Arbor thru Cycle Clutch Latch Extension. B. Extra cycles can be caused by the following: Ensure all PSCC adjustments are correct.
Erratic PSCC Drive	Erratic drive of the PSCC will cause the print shaft to rotate at uneven speeds. When the print shaft speed is not constant, it will affect some of the critical timing relationships within the machine, particularly in the carrier. As the selection cams come to the rest position, the selection pins contact the high dwell of the cams. If erratic PSCC drive occurs at this point, a selection pin is "hit" by the cam (several times), which causes a pinblock vane to vibrate. As the next selection cycle starts, the vane is still in motion. This will allow an unwanted pin, or no pin to fall. Erratic PSCC drive can also cause the typehead to overdrive or underdrive. This will cause the rotate detent to not enter the correct typehead tooth. This failure on paper will be a "split character". If erratic PSCC drive occurs at 85°, as the PFB switch closes, the PFB switch will appear to "bounce". A "bounce" is defined as a reed switch momentarily changing states. For example, if the PFB switch is closed (0 V) and a bounce occurs, the switch momentarily opens (5 V) and closes again (0 V). Other causes of a bouncing PFB switch are listed in the repair actions of the next failure.	A. Check/adjust Print Shaft Cycle Clutch adjustments from Cycle Clutch Arbor thru Cycle Clutch Latch Extension. B. Check/adjust Print Shaft Belt. C. Lubricate per specifications.

Symptom	Reason for failure	Repair actions
PFB switch bounce	With a properly operating print feedback, the logic can reliably control the overall machine timing and machine functions. It is important to remember that the primary purpose of the PFB switch is to reliably close at 85°, remain closed until 300°, and open reliably at 300°. When the PFB switch bounces, the logic actually "sees" another print shaft cycle. When the bounce occurs, the PFB opens (the logic thinks this is 300° of the first cycle), and closes (the logic thinks this is 85° of the next cycle). Different types of failures occur depending upon where the bounce occurs in relation to the printshaft rotation. A bounce in the PFB switch can cause pin-block, velocity, and escapement failures just to name a few.	A. Check/adjust Print adjustments from Print Shaft Belt thru Print Shaft End Play and from Print Feedback Pointer thru Print Feedback Timing. B. Check for loose connections. C. Ensure PFB integrator is installed. CEM 266 D. Replace PFB Switch and Magnet.

In general, when diagnosing mechanisms that receive their drive from the print shaft, do not overlook the complete print shaft drive. Start at the motor, thru the motor clutch, thru the motor drive belt, thru the upper shaft to the print shaft cycle clutch arbor, thru the print shaft cycle clutch, thru the print shaft belt, to the print shaft and print feedback. Any failure in this train of motion can cause failures in mechanisms that receive their drive from the print shaft or uses print feedback for timing.

Noise can be classified into two areas: Idle noise and Typing noise. With the motor on and the printer not operating (idle), only the motor, upper shaft, and associated parts are turning. These parts must be properly adjusted and lubricated to minimize noise. Noise during typing can be attributed to either these same parts or the additional moving parts. Therefore perform both checks for typing noise.

Symptom	Reason for failure	Repair action
Idle Noise.	Any mechanism that can transfer the idle noise of the motor to the covers should be checked for adjustment and/or lubrication.	A. Check for cracked snubber. B. Check/adjust Motor & Drive adjustments from Motor Clutch Pawls thru Motor Fan. C. Check/adjust Print Shaft Cycle Clutch adjustments from Cycle Clutch Arbor thru Check Pawl. D. Check/adjust Leadscrew Drive adjustments from Power Module Bearings thru Leadscrew Belt Tension. E. Check/adjust Covers adjustments from Top Cover Hinges thru code Switch.
Typing Noise.	In addition to Idle noise, any mechanism that can transfer noise due to impact or rotation should be considered.	A. All Idle noise Repair Actions. B. Check/adjust Print adjustments from Velocity Cam Follower thru Powered And Free Flight. C. Check/adjust Fine Alignment adjustments from Front Carrier Shoe thru Rear Carrier Shoe. D. Lube Index Driven Gear Eccen.

System busy is defined as the keyboard cycling normally and no print occurring. System busy can be caused by an escapement/print feedback failure or an electrical problem (shorted switch circuit or logic). To determine if the system busy is caused by escapement/print feedback failure, type several characters with the machine in the system busy mode. Then, manually energize the PSCC. If the machine prints the characters then the system busy was caused by an escapement/print feedback failure.

Symptom	Reason for failure	Repair actions
System busy due to escapement/PFB	The required number of emitter pulses were not detected by 85° of the next print shaft cycle (PFB closes at 85°). This can be caused by a mechanical bind of the escapement mechanism (inhibitor does not come out of emitter wheel ratchet, magnet does not hold, leadscrew is binding, lubrication), no leadscrew drive from the power module, or a PFB bounce.	A. Check/adjust Escapement adjustments from Leadscrew End Clearance thru Emitter Bracket. B. Check/adjust Leadscrew Drive adjustments from Upper Shaft thru Drive Magnet. C. Check/adjust Print adjustments from Print Feedback Pointer thru Print Feedback Timing. D. Check Print Shaft Drive Diagnostics.
System busy - motor reset performs properly but remains system busy	This failure is usually caused by a shorted switch (keyboard, code, message, or SAPI). However, it can also be caused by a loose connection between the boards.	A. Perform static voltage check. B. Check/adjust/replace Print adjustments from Print Feedback Pointer thru Print Feedback Timing. C. Check for loose connections.
System busy - motor reset does not complete but Main POR functions properly.	This failure normally occurs for one of three reasons. 1. The POR switch does not operate properly. 2. A loose connection between the boards. 3. A bounce in the PFB circuit was detected by the logic. Other possibilities are an electrical component failure (power supply or logic) or incorrect/interrupted line voltage.	A. Check/adjust POR Reed Switch. B. Check/adjust Print adjustments from Print Feedback Pointer thru Print Feedback Timing. C. Check for loose connections. D. Replace power supply or logic.
System busy - neither motor reset nor Main POR will function.	This failure is caused by an electrical failure in one of the boards.	A. If voltage from transformer to power supply is missing replace both the power supply and the transformer. B. If transformer voltages are ok but power supply voltages are missing, replace power supply. C. If transformer and power supply voltages are ok, replace logic.

Symptom	Reason for failure	Repair actions
System busy – WAIT light on.	The memory was being searched and a message panel switch instruction occurred before the search was completed. This occurred because of a bounce in the message panel switch, foreign material shorting the cable connections, or the operator depressed a message panel button while the WAIT light was on.	A. Check wiring for loose connections and/or shorts. B. Replace the message panel. C. Instruct operator on proper operation of the message panel buttons.
System busy – all message panel lights on.	This is an absence of the +5 volt line in the power supply.	A. Replace the power supply.

An unwanted POR or pitch change can be caused by a bouncing or improperly adjusted reed switch. An unwanted POR can also be caused by an intermittent interruption in the power source. Use the chart below to identify the failing switch.

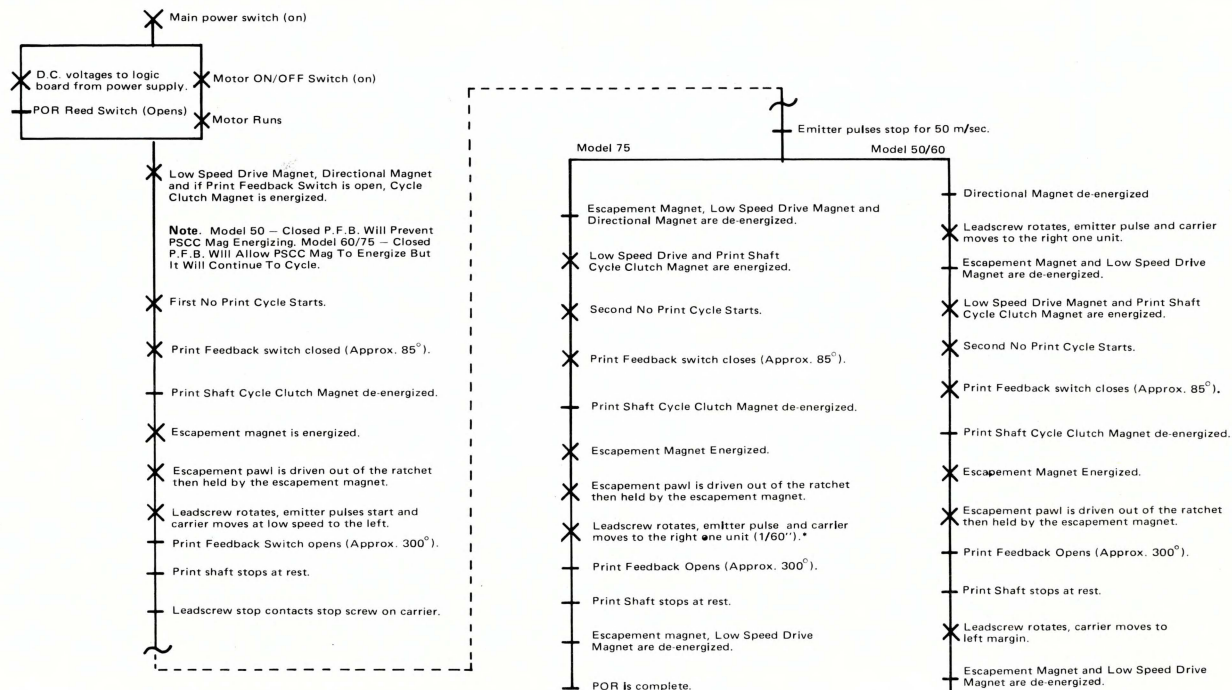
MODEL	SYMPTOM FOR PITCH SWITCH FAILURE	SYMPTOM FOR POR SWITCH FAILURE
50	Low speed reverse to zero then high speed* forward to left margin.	Low speed reverse to zero then high speed* forward to left margin.
60	High speed* reverse to zero then high speed* forward to left margin.	Low speed reverse to zero then high speed* forward to left margin.
75	High speed* forward or reverse to left margin.	Low speed reverse to zero then high speed* forward to last carrier position.

* High speed is used only if required carrier movement is greater than 1 ½ inches.

If the machine fails to complete a POR but drives to right side frame, manually disengage the escapement pawl and rotate the emitter wheel by hand moving the carrier away from the right frame. Now the following symptoms can be more closely observed. These failures are the two most common failures with the symptom of driving into the right side frame on POR.

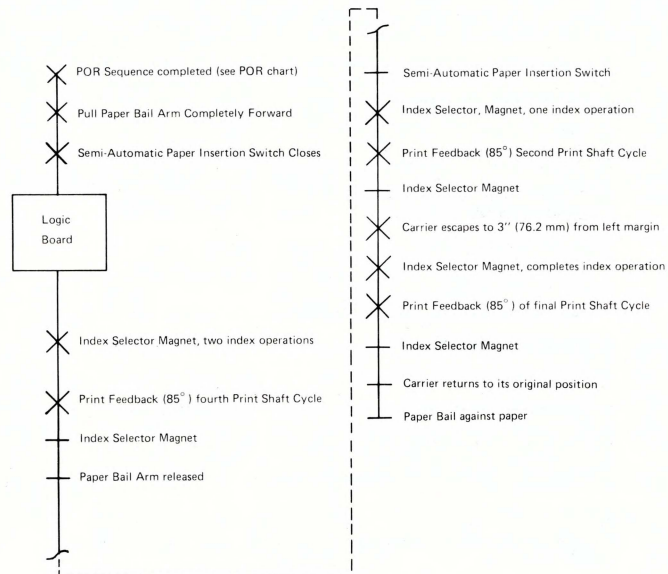
Symptom	Reason for failure	Repair action
Carrier moves to left approximately one inch then drives to right frame at low speed.	The logic is not receiving pulses from the emitter board due to an open or shorted emitter board, bad wiring, or bad logic.	A. Check wiring. B. Replace emitter board. C. Replace logic.
Model 75 Carrier moves to left but does not reach absolute zero position. Then the carrier drives to last carrier position.	The logic sensed the 50 millisecond delay in emitter pulses and "thought" it was at the absolute zero position. Then the machine tried to drive to the last carrier position. This can be caused by binds in the carrier transport mechanisms or extra cycles of the Print Shaft Cycle Clutch.	A. Adjust Leadscrew Stop. B. Adjust Leadscrew Nut. C. Check/adjust Fine Alignment adjustments from Front Carrier Shoes thru Rear Carrier Shoes. D. Check/adjust Leadscrew Drive adjustments from Upper Shaft thru Drive Magnet. E. Check Print Shaft Drive Diagnostics.

If the machine fails to POR use the POR Sequence Chart to determine which operation failed.

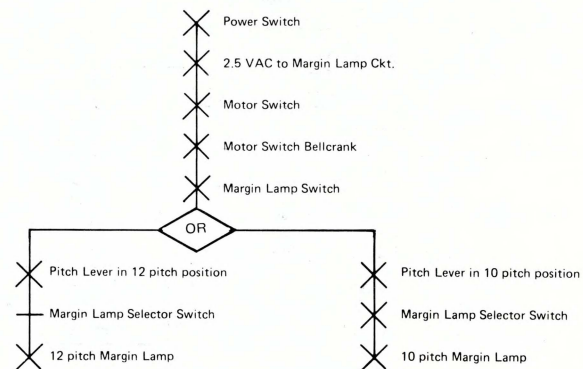


*Note. If the power to the power supply has not been interrupted and the left margin has been set, the carrier will move to the right until it is at the margin position. (Model 75 will relocate to original position). This will take place instead of the one unit escapement indicated in the above chart. If the left margin is more than one and one half inches from the extreme left of the machine, high speed magnet will be used for the forward carrier motion until it is one and one half inches from the margin position.

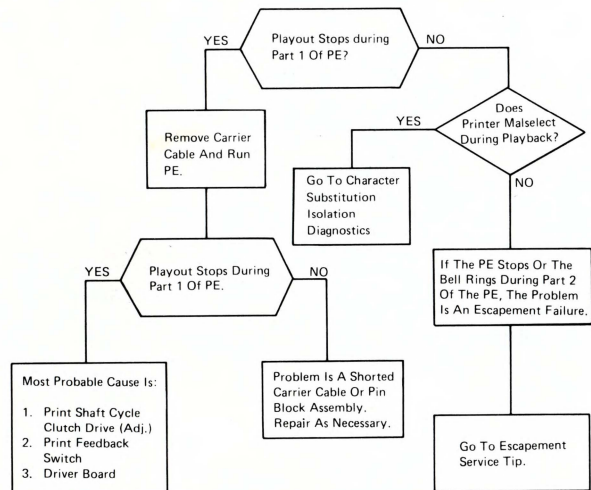
SEMI-AUTOMATIC PAPER INSERTION



LIGHTED MARGIN



PRINTER EXERCISER (PE) DIAGNOSTIC CHART (Model 75)



SWITCH FAILURE SYMPTOM INDEX

Symptom	Switch
1. *No POR while switching pitch Types in wrong pitch	P1/P2
2. Print shaft cycles continuously. Power module drives but PSCC does not energize (Model 50).	PFB
3. No POR with motor switch No POR with both power and motor switch PSCC picks when motor switch is turned off.	POR
4. Malselection (from keyboard) System busy	Keyboard Reads (1 to 6)
5. Characters type in only one case.	Keyboard Mode (Reed 7)
6. Typehead hunts 360° (Models 50/60) Characters print in opposite case (Model 75).	Shift Mode

Corrective Action: Refer to the static voltage check and verify the failing switch. Check wiring, loose connectors, adjustments, and continuity of the switch. Repair or replace as needed.

*The Model 50 does not POR between PS and PSN.

+8K TEST PROCEDURE

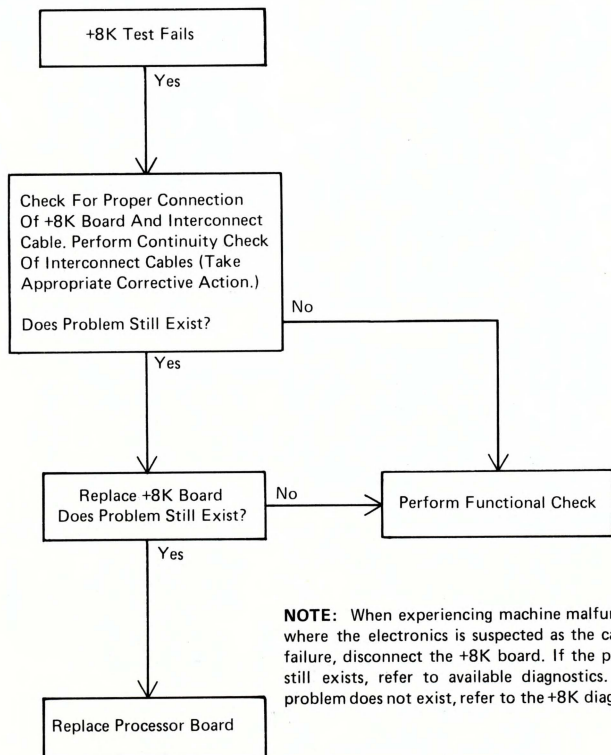
Whenever possible, include the +8K test in the functional check, Model 75 additional checks.

Perform each step as indicated. If any step fails or cannot be completed, refer to the +8K diagnostic. Memory must be cleared before and after performing this test.

1. Insert a sheet of 8-1/2" x 11" typing paper.
2. Place pitch selector in the 12-pitch position.
3. Set left margin at the left edge of the paper.
4. Depress "Store + 1."
5. Type a line of "x's" to the right edge of the paper plus carrier return (†100 characters stored in 1).
6. Depress "Store + A."
7. Depress and release "ADV + 1" ten times (†1,000 characters stored in A).
8. Depress "RTN + 2" (†1,000 characters stored in 2).
9. *Depress and release "ADV + 2" eight times (†9,000 characters in A = 10,100 total).
10. a. Type several characters.
- b. Turn motor switch off and back on.
- c. *Erase characters.
11. *Depress "RTN + All." Wait indicator lights for 4 seconds.†
12. The test is complete.

*Improper connection of the interconnect cable may cause these steps to fail.

†Approximate — Depending on the amount of "x's" in step 5.

+8K Diagnostics

NOTE: When experiencing machine malfunctions where the electronics is suspected as the cause of failure, disconnect the +8K board. If the problem still exists, refer to available diagnostics. If the problem does not exist, refer to the +8K diagnostic.

Component Description

Memory Protection (MP) Control Card

The MP control card is mounted to the brackets on the right side of the keyboard with one insulated screw and two metal screws. The MP control card controls the memory support operation as described in the theory of operation. It is connected to the power supply by the MP cable. The MP indicator, batteries and MP switch are also connected to the MP control card. A charge LED is mounted on the MP control card for CSR use. During the diagnostic check, the charge LED will light to indicate that the charge circuit is functioning properly. In addition, there are test points and a test connector to check the batteries. (See Figure 1.) The test connector is labeled T; the battery connections are labeled J-1, J-2, and the test points (TP) are labeled TP1, TP2, and TP3.

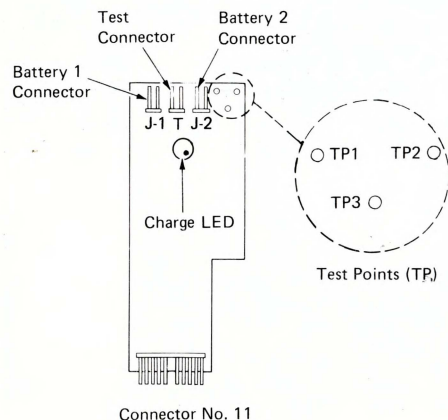


Figure 1

Batteries

There are two packs of batteries, six batteries in each pack. The packs plug into the MP control card at the J-1 and J-2 connectors. (Either pack may plug into either connector.)

The batteries are designed to protect memory for 15 to 30 minutes, with an average life of three years. **(Battery life is dependent upon: the number of times used, length of each protect mode, and temperature.** Under normal use, protection time diminishes with age [for example, 30 minutes protection when new, 15 minutes protection after three years].) It should be noted that, although memory protection time may drop below 15 minutes, it could still provide adequate protection to the customer.

Batteries become fully charged after approximately 48 hours of machine operation. **(Recharge time is affected by age, usage, frequency, duration of each protection cycle, and temperature.)** Whenever installing the MES or replacement batteries, the customer should be informed of this requirement. However, after six hours of operation, the customer can expect at least two minutes of protection.

When replacing batteries, always replace both packs at the same time. (The battery pack part number includes two packs of batteries.) Each battery pack contains an internal nonreplaceable fuse. If the batteries are shorted, a potential overheat condition may exist prior to the fuse blowing. Therefore, extreme care should be exercised when handling the batteries.

MP Indicator

The MP indicator informs the operator of two possible conditions:

1. **Protect Mode** – Whenever the typewriter is in the protect mode, as discussed in the theory of operation.
2. **Battery Failure Mode** – Whenever the MP has a shorted or open cell. The MP indicator will turn on. This will indicate to the customer to place a service call.

NOTE: The operator instructions will inform the operator that if the machine can be used and the MP indicator remains on for more than 10 minutes, a service call should be placed. However, it is normal for the indicator to turn on for a few seconds or minutes during typing after a power outage.

When installing the MP indicator, ensure that the wires are properly installed. (See wiring diagram.)

MP Switch

The MP switch is located to the left of the primary power box and is mounted under the right front transformer mounting screw. Whenever the main power switch is operated, the MP switch operates to **inform** the MP control card of the typewriter status (main power on or off). With main power off and the MP switch closed, the memory will be cleared.

Diagnostics

The diagnostic check allows the CSR to determine if the MP is functioning properly. A procedure is provided to check the batteries, MP charge circuit, indicator, and MP switch. If the components successfully pass the checks, the MP is functioning properly. In addition to these checks, a wiring diagram and static check is provided to check for proper voltages.

When experiencing a memory protection failure, perform the **complete** diagnostic check to aid in identifying the failing component.

Diagnostic Check

Battery Check

Place VOM on the 12 VDC scale — black lead in COM, red lead in VOM, main power on.

Battery 1 — Black lead on (test point) TP3 — red lead on TP1.

Battery 2 — Black lead on GND — red lead on TP3.

Each battery should read 7-9 VDC. If meter reads less than 6.1 VDC, the batteries should be replaced. If the batteries read between 6.1 and 6.9 VDC, this may indicate a shorted cell; continue with the test.

NOTE: If either battery 1 or 2 reads approximately 14 VDC, this may indicate a blown battery fuse or bad connection. The 14 VDC is the approximate voltage from the MP control card charge circuit.

Differential Check

1. Unplug battery 2 and connect it to the *T* test connector.
2. Place the VOM on the .6 VDC scale — black lead on TP1 — red lead on TP2. If meter needle deflects left, the leads should be reversed.
3. Reading should be between 0 and .9 VDC. If reading is more than 1.0 VDC, the batteries should be replaced. Plug battery 2 back into the J-2 connector.

NOTE: The meter selector lever may need to be placed on a higher DC scale.

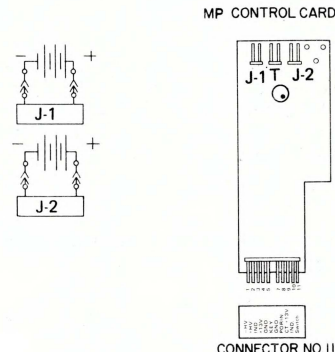
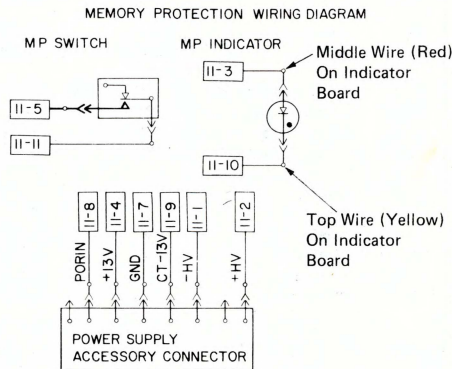
Charge Circuit Check

1. Unplug battery 1 and connect to *T* (test).
2. If the charge circuit is functioning properly, the charge LED on the MP control card will light. If the LED does not light, replace the MP control card.

NOTE: A blown battery fuse or bad connection will not allow the charge LED to light.

Indicator Check

Unplug a battery connector; the indicator should light. If it does not light, check indicator wiring and static/active check of indicator.



Memory Protection Control Card Static Check

Pin No.	Name	Static	Active
11-1*	-High Voltage (-HV)	-20V to -28V	—
11-2*	+ High Voltage (+HV)	+20V to +28V	—
11-3	MP Indicator	+13V	+13V
11-4*	Power Supply +13V	+13V	—
11-5*	GND	0	0
11-6	Key	—	—
11-7*	GND	0	0
11-8*	PORIN	+5V	—
11-9*	CT 13V	+13V	—
11-10	MP Indicator	+11.8V	+11V
11-11	MP Switch	+1.3V**	0V

All voltages are DC $\pm$ unless otherwise specified. All static readings are taken with the main power and motor switch on.

*With main power on, perform the static check of the power supply voltages. These voltages are supplied from the power supply to the MP control card. If any of these voltages are incorrect, check for the proper voltages at the power supply accessory connector. If voltages are correct, replace the cable; if incorrect, remove connector No. 11 from the MP control card and check the voltages at the power supply again. If voltages are correct, replace control card; if incorrect, replace the power supply.

**Switch Check

NOTE: Turning main power switch off will clear memory.

1. Set VOM to 12 VDC scale, black lead on GND, red lead on MP switch pin 11-11. The meter should indicate 1.3 VDC.
2. Manually operate the MP switch. The reading should be 0 VDC. (The switch can be operated from the bottom of the machine.)

Service Tips

- To determine if the memory protection feature can protect memory, perform the following:
 1. Tab to center of writing line.
 2. Unplug the linecord from the AC outlet.
 3. Observe that the indicator light is **on**.
 4. Plug the linecord into the AC outlet.
 5. The carrier should POR and relocate back to the center.
- When linecord is disconnected for servicing, the main power switch should be **off**. If the switch is **on**, the MP will supply DC voltages.
- If the linecord is disconnected for machine storage, ensure main power is **off**.
- Batteries may be replaced without turning off main power.
- When making meter checks at connector No. 11, ensure the meter leads do not touch the frame.
- When removing the top cover of a machine with the memory protection feature installed, use the rear slot in the right-hand cover latch. Using the front slot may cause damage to the MP indicator.

Battery Removal And Replacement Procedure (Models 75/85)

1. Unplug the J-1, J-2, and No. 11 connectors, and the MP indicator wires.
2. Remove the outrigger bracket assembly (38-2).
3. Loosen the four battery bracket mounting screws (38-19).
4. Observe the position of the battery packs and brackets. Remove each battery pack and install the new batteries. Adjust the battery brackets.
5. Reinstall the outrigger bracket assembly (38-2).
6. *Plug the battery connectors into the J-1 and J-2 connectors of the MP control card. (Either battery may be connected to either J-1 or J-2.) Wrap the battery wires around each other and position them out of the way.

Install connector No. 11 and the MP indicator wires.

7. Perform diagnostic check.

***Warning:** When installing the battery connectors, observe the locating pin. If battery connectors are installed incorrectly, damage to the electronics will result.

SERVICE TIPS**Carrier/Replacement Or Crash**

NOTE: These checks **MUST** be made before power is applied.

1. Check print shaft timing; ensure that print shaft gear is not loose, or print shaft cycle clutch is loose.
2. Check print feedback magnet adjustments.
3. Check the print feedback reed switch; ensure that it is not broken, shorted, or out of timing.
4. Check for binding selection solenoid plungers (sticking or no airgap); also check for missing springs.
5. Check timing of selection cams; also check for broken teeth on print sleeve gear, intermediate gear and selection sleeve gear.
6. Check the selection pins (broken, chipped or bent).
7. Check the rotate rack solenoid for binds (DIRT, GREASE, OIL) or broken cam follower.
8. Check rotate pinion adjustments or loose setscrews.
9. Check rotate and tilt cam followers (broken, bent or loose).
10. Check free and power flight adjustments.

11. Check the print shaft cycle clutch for loose setscrews and a broken or missing rubber insert on the latch. Also check the back check pawl and adjustments.
12. Check for broken or missing cogs on the print shaft and motor drive belts.
13. Check for worn motor pawls.
14. Hand cycle several characters before putting belt on.

Leadscrew Drive

Leadscrew Nut — This adjustment must be made; it cannot be checked. Loosen the four mounting screws, leave the bracket mounting screws (06-28) friction tight. Hand cycle the print shaft until the leadscrew lock is engaged. Loosen the lock link. Center the nut mounting screws (06-17) left to right and tighten. Loosen bracket mounting screws. Center the screws left to right and tighten. Rotate the print shaft until the lock link moves approximately .020" (0.51 mm), then tighten the link.

Carrier Binds — Remove the escapement pawl spring (06-57) and the arm spring (10-198). Rotate the emitter wheel to move the carrier. There should be no binds. Check front rail support, carrier buffers and rear carrier shoe adjustment.

Leadscrew Clutch — Check for 2-4 pounds of carrier drive during low speed using a spring scale. Check leadscrew belt tracking.

Lower Power Module Shaft Binds — Check all clearances between the lower shaft components per the APM. Also, put two drops of No. 10 oil between the leadscrew pulley and the lower shaft.

Print Shaft Cycle Clutch — Check for extra cycling. There should be no lubrication anywhere on the magnet assembly. Clean if lubrication is present. Check for loose studs (10-72, 151). Lubricate the PSCC with No. 23 grease. Check the adjustments per the APM.

Low Speed/Direction Magnets — There should be no lubrication anywhere on these magnet assemblies. Remove the assemblies, if necessary, and check for binds. Check/adjust the adjustments per the APM. Also, put two drops of No. 10 oil between the leadscrew pulley and the upper shaft.

Low Speed Arbor And Leadscrew Belt — Check these adjustments per the APM.

Escapement

Escapement Magnet Assembly — Remove the assembly and the escapement pawl. Clean the pawl, the magnet core and the pivot points with a clean shop cloth. Reassemble the magnet and be sure the pawl moves freely with no binds, and the pawl spring hangs to the side. Check for loose shockmount screws. If screws are loose, replace the magnet assembly. Reinstall the magnet assembly. Adjust the escapement pawl-to-ratchet clearance and the emitter bracket adjustment.

Escapement Release — Adjust the escapement inhibitor, the escapement inhibitor stopscrew and the escapement link.

Escapement Wheel And Ratchet Assembly — Check the inhibitor entry on three or four teeth of the ratchet. If the entry differs, replace the ratchet. Apply a thin film of No. 23 grease on all the ratchet teeth.

Emitter Board/Bracket — Check for good electrical contact of the emitter board wires. Check the emitter board adjustment left to right. Make the emitter bracket adjustment.

Escapement Actuator Assembly — Check the assembly for binds. If a bind exists, remove the assembly. Check for a loose stud. Clean the assembly and the stud. Relubricate with No. 23 grease. (It is normal for some actuator assemblies **not** to restore during a hand cycle operation.)

Print Feedback Switch/Magnet — Check the print feedback switch for a broken reed switch glass. Check the wire connections and all the adjustments. Check the print feedback magnet for scratches or cracks in the magnet.

LUBRICATION GUIDE

The machine must be lubricated on every service call.

Warning: Because oil and grease affect rubber, special care should be taken to prevent lubricants from contacting the platen, feedrolls, paper bail rolls, rubber mounts and drive belts.

Carrier (All Models)

All Non-Rotating Bearing Surfaces	
Otherwise Specified	No. 23
Ball Joint	No. 23
Correcting Latch	No. 10
Correcting Tape Feed Bellcrank Pivots	No. 10
Correcting Tape Feed Cam Follower Pivots	No. 10
Correcting Tape Feed Latch Pivots	No. 10
Correcting Tape Feed Swing Arm	No. 10
Correcting Tape Lift Arm Mounting And Pivots	No. 23
Correcting Tape Load Lever Pivot	No. 10
Correcting Tape Spiked Wheel Pivot	No. 10
Element	Silicone or No. 23
Impression Control Lever Pivot	No. 23
Leadscrew Nut and Lock	No. 10
Print Shaft Wipers	No. 10
Rack Transfer Bracket Pivots	No. 10
Rear Carrier Shoe	No. 10
Ribbon Feed Pawl	No. 23
Ribbon Lift Control Lever	No. 23
Ribbon Guide Plate	No. 23
Rotate Rack Plate Rear Pivots	
And Cam Follower	No. 23
Selection Pins	No. 10
Selection Sleeve And Cams (Thin Covering)	No. 23
Selection Vanes And Support Shafts	No. 10
Tape Lift Actuator Pivots	No. 10
Tilt Bellcrank Pivot	No. 10
Tilt Cam Follower	No. 23
Tilt Ring Pivots	No. 23
Velocity Cam Follower	No. 23
Velocity Cam Follower Roller	No. 10
Velocity Slider Latching Surface	No. 10

Keyboard (50/60/75)

Balls In Comptube	No. 10
Filter Bail Guide LH And RH	No. 23
Filter Bail Pivots	No. 23
Filter Bail Surface	No. 23
Front Interposer Guide And Fulcrum Rod	No. 23
Keyboard Mode Latch	No. 23
Keylever Fulcrum Rod And Pivots	No. 23
Keylever Pawl Spring And Contact Area	No. 23
Keylever Restoring Spring Contact Area	No. 23
Keylever Return Spring	No. 23
Rear Interposer Guide Slots	No. 10
Release Latch	No. 23
Repeat Keylevers At Leaf Springs	No. 23
Selection Bail Pivots	No. 23
Shift Bail	No. 23
Space Bar Pivot Points	No. 23

Keyboard 85

Shift Lock Bail Pivots	No. 23
Spacebar Bail Pivots	No. 23

Power Module And Motor

All Bearings	No. 10
All Drive Clutch Springs And Arbors	No. 10
Keyboard Clutch Spring And Arbor (Through Screw Hole)	No. 23

Motor And Drive 85

Motor Pulley And Shaft	No. 23
Print Shaft Cycle Clutch Spring And Arbor (Through Screw Hole)	No. 23
Print Shaft Cycle Clutch Latch Contact Points (At Magnet Armature, Sleeve And Restore Cam)	No. 23
Print Shaft Cycle Clutch Latch Pivot	No. 23
Print Shaft Back Check Collar	No. 23

Main Frame

Bottom Cover Latches	No. 23
Escapement Actuator Pivot	*No. 23
Escapement Cam Follower And Pivot	No. 23
Escapement Link Clevis (At Actuator)	No. 23
Escapement Pawl Return Spring	No. 23

Escapement Ratchet (Thin Coating)	No. 23
Index Cam (Between Cam And Gear)	No. 10
Leadscrew	No. 10
Leadscrew Bearing	No. 10
Leadscrew Nut	No. 10
Link And Clevis Pins	No. 10
Multiplying Lever Stop (Model 75)	No. 23
Paper Guide Groove	No. 23
Platen Bushing	No. 10
Rear Rail — Top And Bottom	No. 23
Top Cover Hinges	No. 23
Top Cover Latches	No. 23

Index (All Models)

Index Detent Roller	No. 23
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Index (Model 85)

Index Gears Mounting Studs	No. 10
Index Clutch Pawls Pivot Stud	No. 10
Index Clutch Ratchets And Spacer	No. 10

*Clean off Molycoat and lubricate with No. 23 grease.

NOTE: All bearing areas having rotational motion not otherwise specified require No. 10 oil.

Clean the following as necessary and **do not lubricate:**

Ribbon/correcting cartridge, covers, cardholder, spindles and spools, outside of typehead, platen, motor mounts, wiring, correcting tape lift guide, correcting tape supply and take-up spools, cycle clutch magnet armature upstop, escapement magnet, escapement pawl, and solenoid plungers.

SERVICE MANUAL REMOVAL LIST

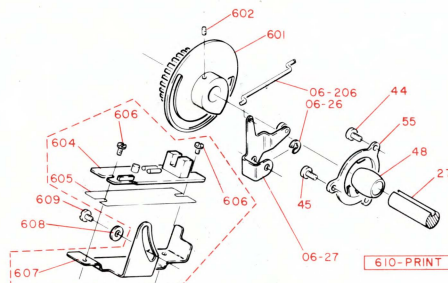
Carrier
Carrier Bottom Plate — Ribbon Cassette System
Carrier Bottom Plate — Selective Ribbon
Compensator Tube Balls
Escapement Motor 85
Keyboard
Leadscrew
Motor, Primary Power Box, Linecord
Paper Feed Assembly
Power Module
Power Module Shaft — Lower
Power Module Shaft — Upper
Print Sleeve — Ribbon Cassette System
Print Sleeve — Selective Ribbon
Rack Transfer Bracket (Steel)
Rack Transfer Bracket (Brass)
Ribbon Plate — Ribbon Cassette System
Rocker Assembly — Ribbon Cassette System
Rocker Assembly — Selective Ribbon
Tilt Cam Follower
Velocity Magnet Assembly

PRINT FEEDBACK

MECH. CODE

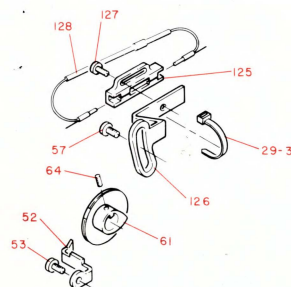
02

IBM 85



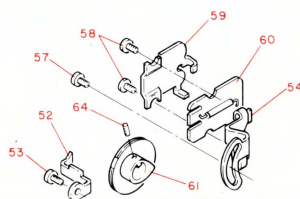
610-PRINT FEEDBACK B/M

LEVEL 2



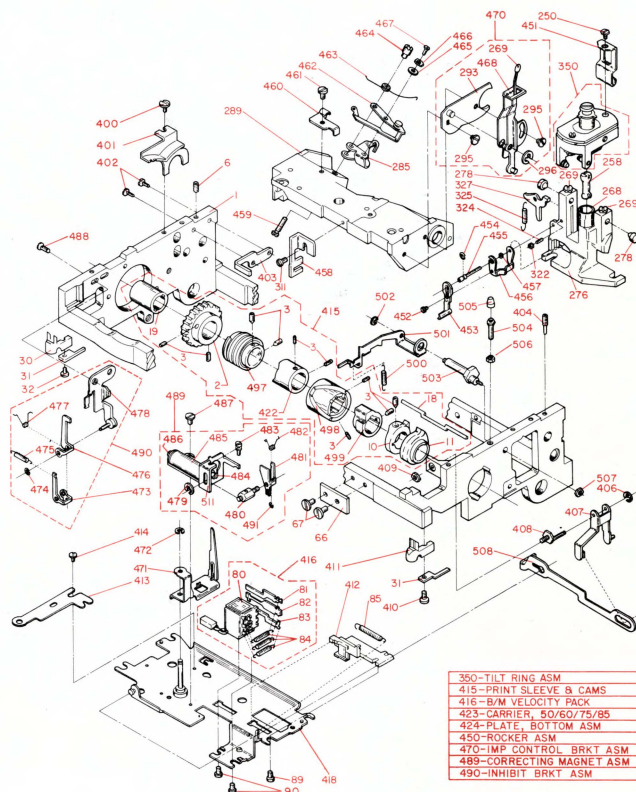
128-PRINT FEEDBACK INTERGRATOR

LEVEL 1

CARRIER/ROCKER
RIBBON CASSETTE SYSTEM

MECH. CODE

02

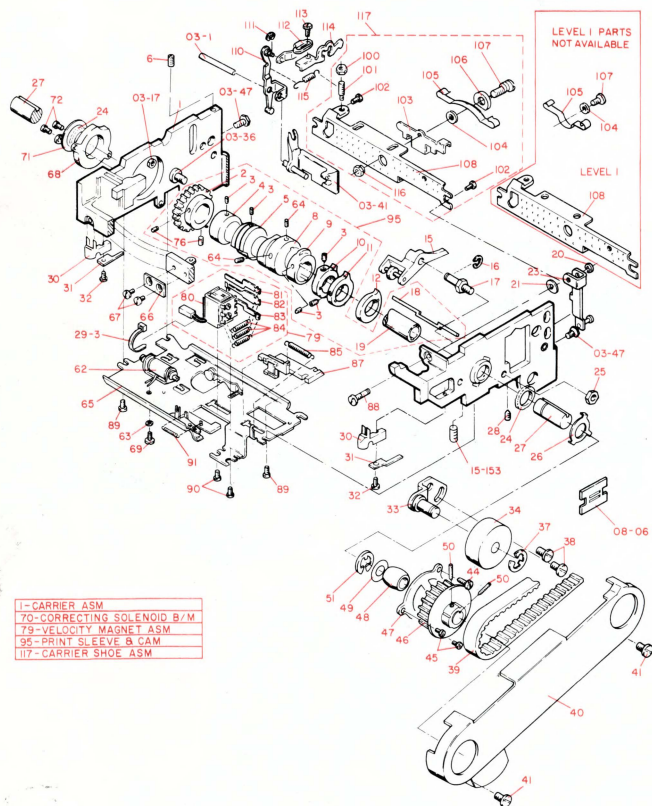


- 350-TILT RING ASM
- 415-PRINT SLEEVE & CAMS
- 416-8/M VELOCITY PACK
- 423-CARRIER, 50/60/75/85
- 424-PLATE, BOTTOM ASM
- 450-ROCKER ASM
- 470-IMP CONTROL BRKT ASM
- 489-CORRECTING MAGNET ASM
- 490-INHIBIT BRKT ASM

MECH. CODE

02

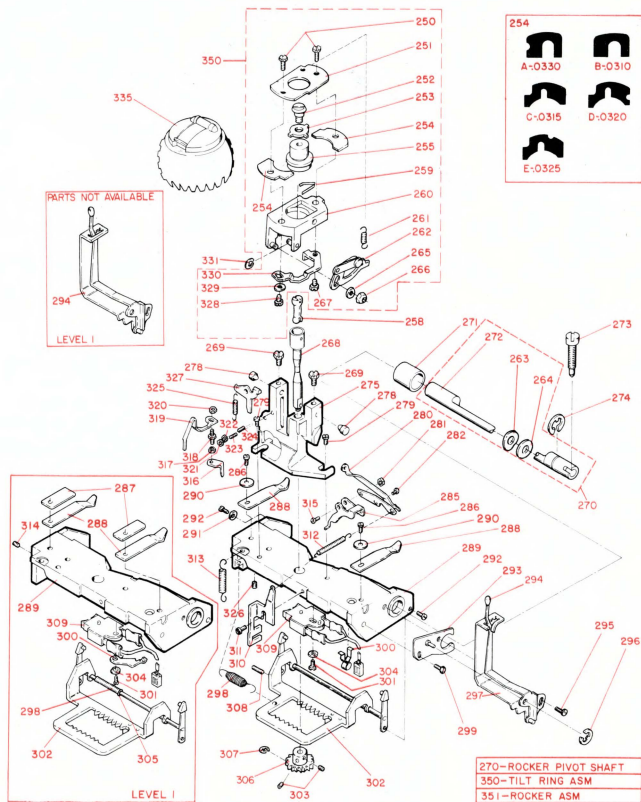
CARRIER



MECH. CODE

02

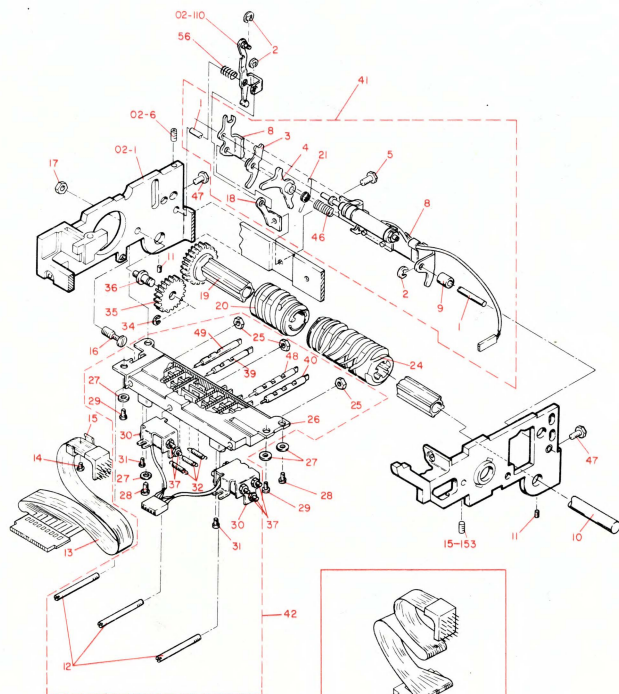
ROCKER



SELECTION

MECH. CODE

03



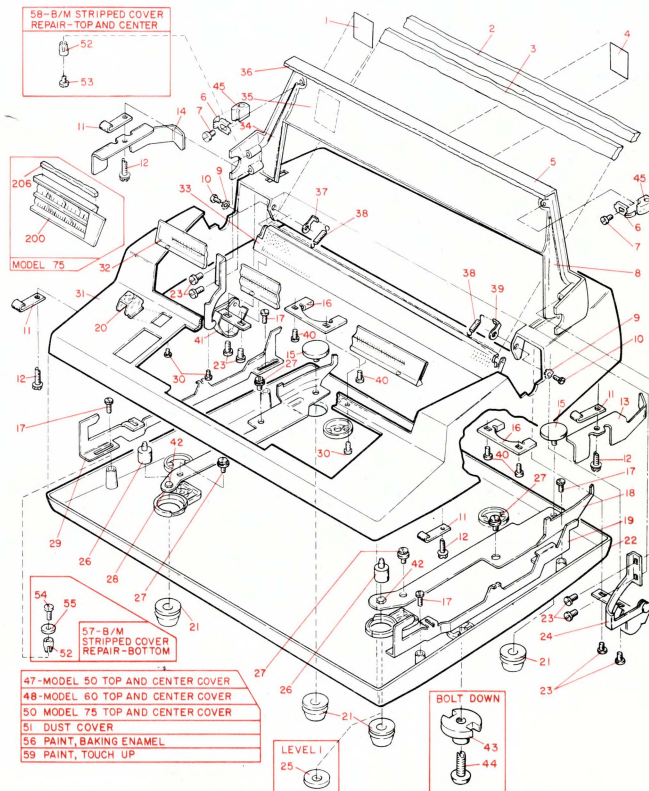
38—INSTALLATION B/M FOR REF 41
 41—RACK TRANSFER BRKT ASM
 42—PINBLOCK & SOLENOID ASM
 51—B/M WIDE PINS AND CAMS

100—MODEL 75
 101—MODEL 85

COVERS 50/60/75

MECH. CODE

05



58-B/M STRIPPED COVER
 REPAIR-TOP AND CENTER

MODEL 75

57-B/M
 STRIPPED COVER
 REPAIR-BOTTOM

47-MODEL 50 TOP AND CENTER COVER
 48-MODEL 60 TOP AND CENTER COVER
 50-MODEL 75 TOP AND CENTER COVER
 51-DUST COVER
 56-PAINT, BAKING ENAMEL
 59-PAINT, TOUCH UP

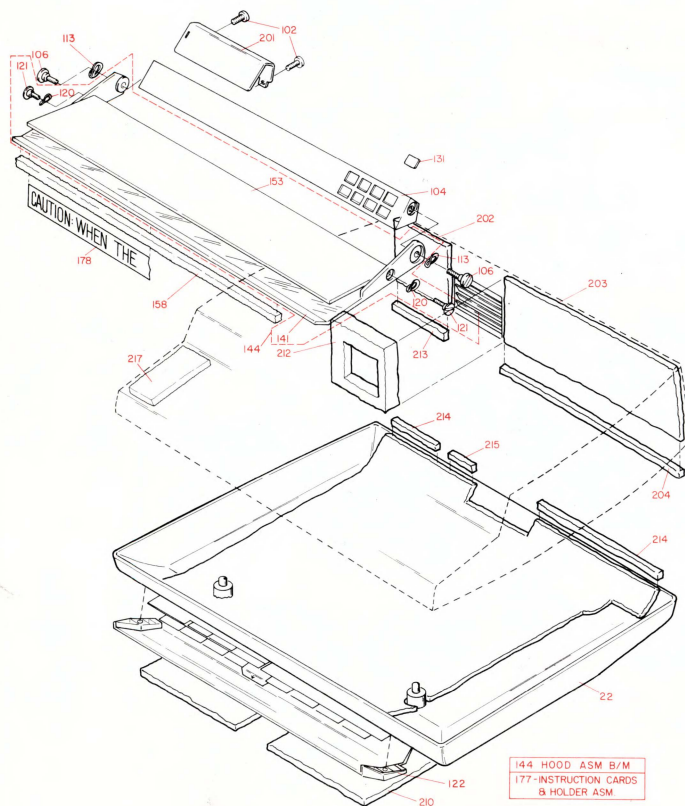
BOLT DOWN

LEVEL

MECH. CODE

05

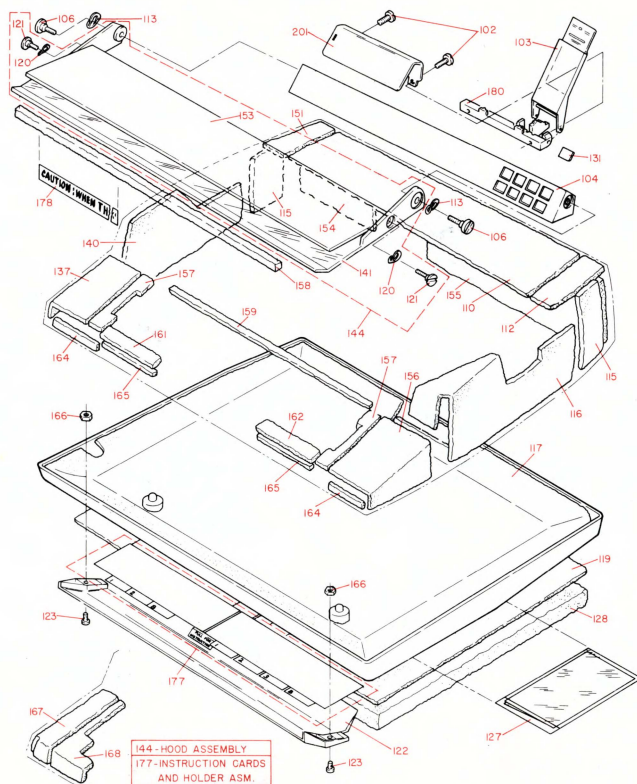
COVERS 50/60 LEVEL 1



MECH. CODE

05

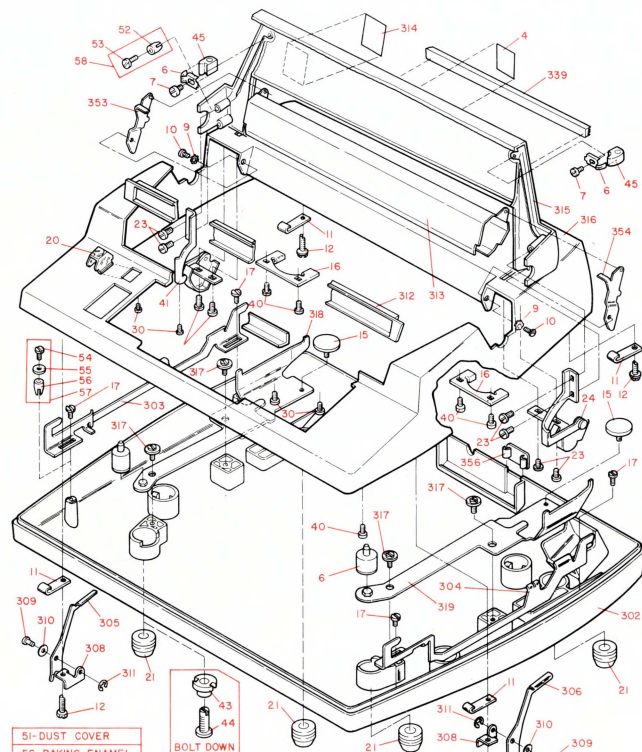
COVERS 50/60/75 LEVEL 2



MECH. CODE

05

COVERS 85



51-DUST COVER
56-BAKING ENAMEL

57-STRIPPED COVER REPAIR,BOTTOM

58-STRIPPED COVER REPAIR,TOP & CENTER

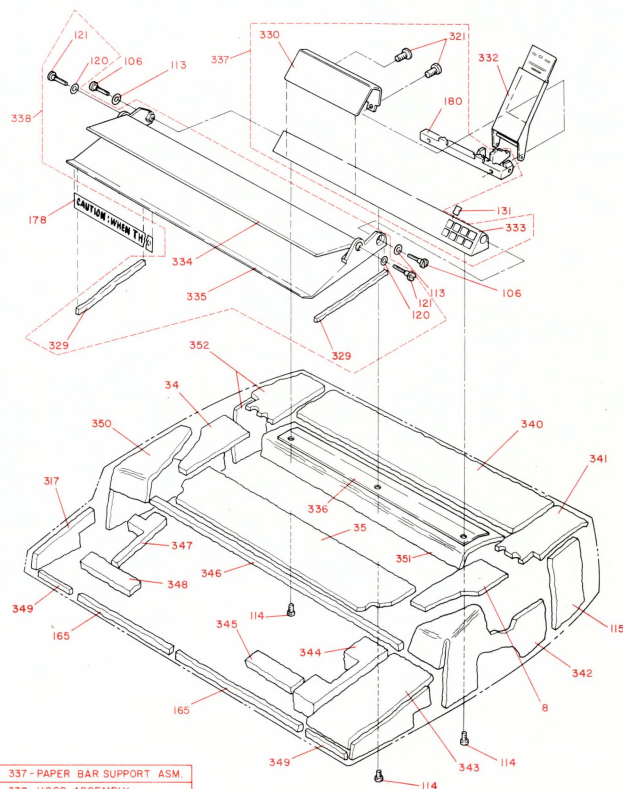
59-TOUCH-UP PAINT

301-TOP & CENTER COVER ASM

MECH. CODE

05

COVERS 85

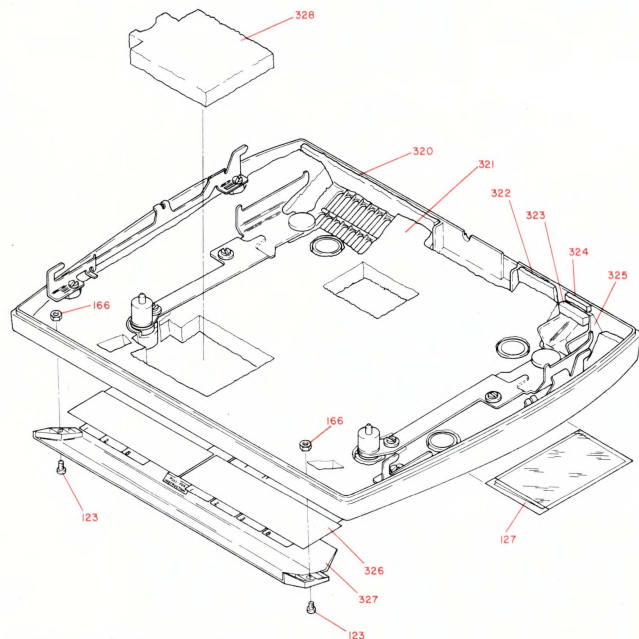


337-PAPER BAR SUPPORT ASM.
338-HOOD ASSEMBLY

MECH. CODE

05

COVERS 85



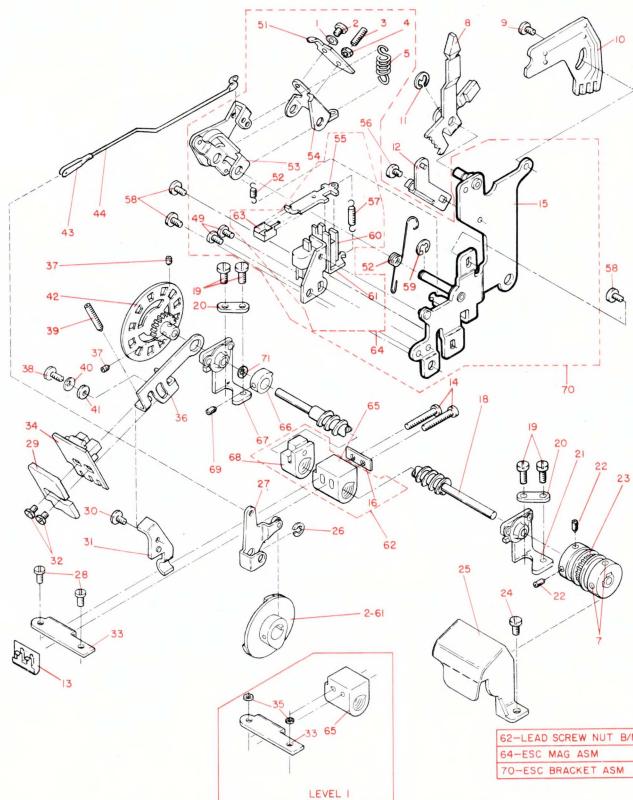
302-BOTTOM COVER ASM.

326-INSTRUCTION CARD AND HOLDER ASM.

MECH. CODE

06

ESCAPEMENT LEVEL 1



62-LEAD SCREW NUT B/M

64-ESC MAG ASM

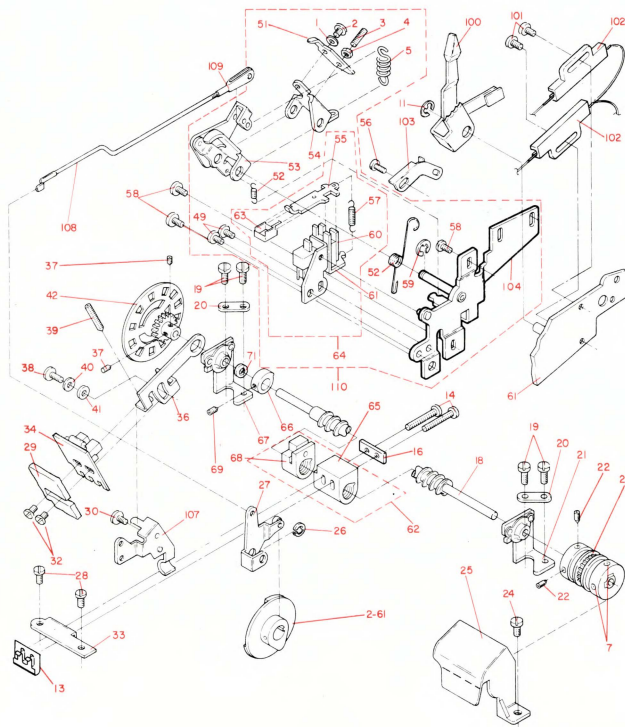
70-ESC BRACKET ASM

LEVEL 1

ESCAPEMENT LEVEL 2

MECH. CODE

06

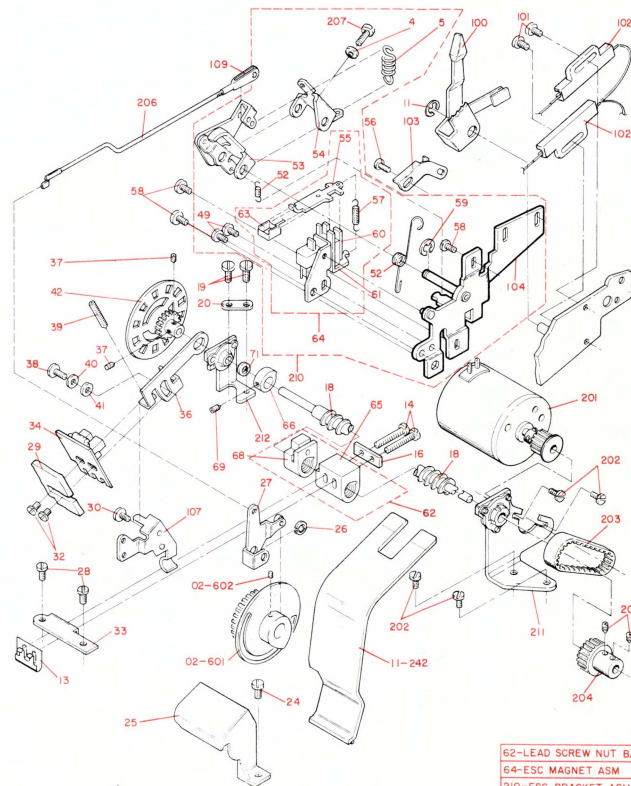


62-LEAD SCREW NUT B/M
 64-ESC MAGNET ASM
 110-ESC BRACKET ASM

ESCAPEMENT 85

MECH. CODE

06

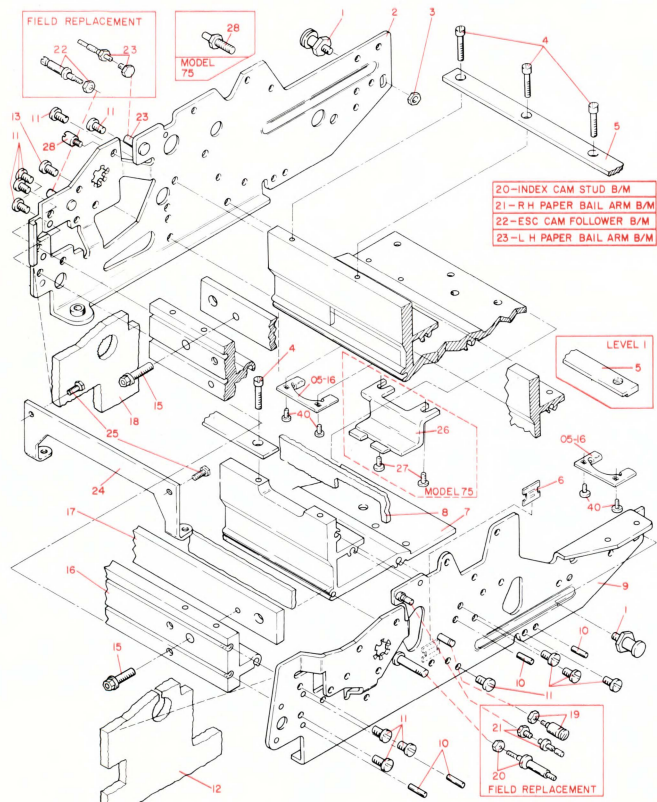


62-LEAD SCREW NUT B/M
 64-ESC MAGNET ASM
 210-ESC BRACKET ASM

MECH. CODE

08

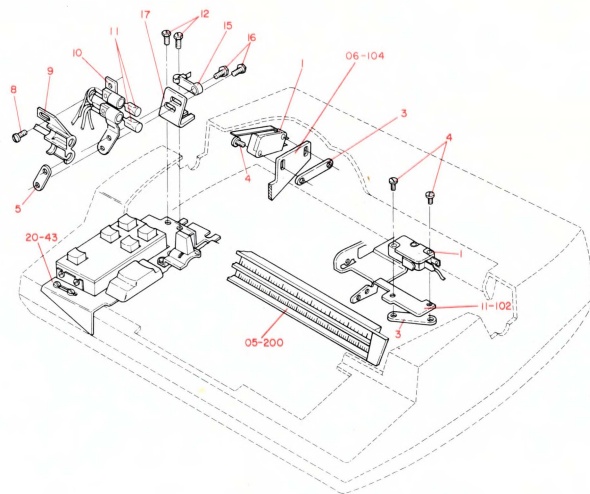
FRAME



MECH. CODE

09

MARGINS 75

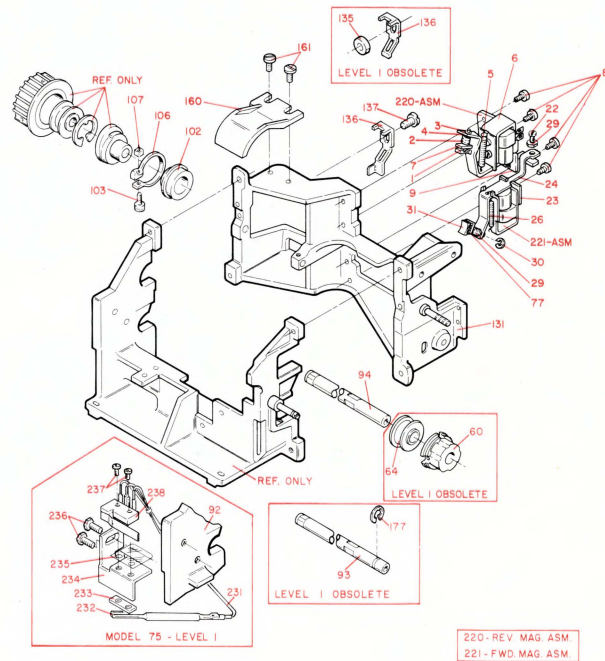


MECH. CODE

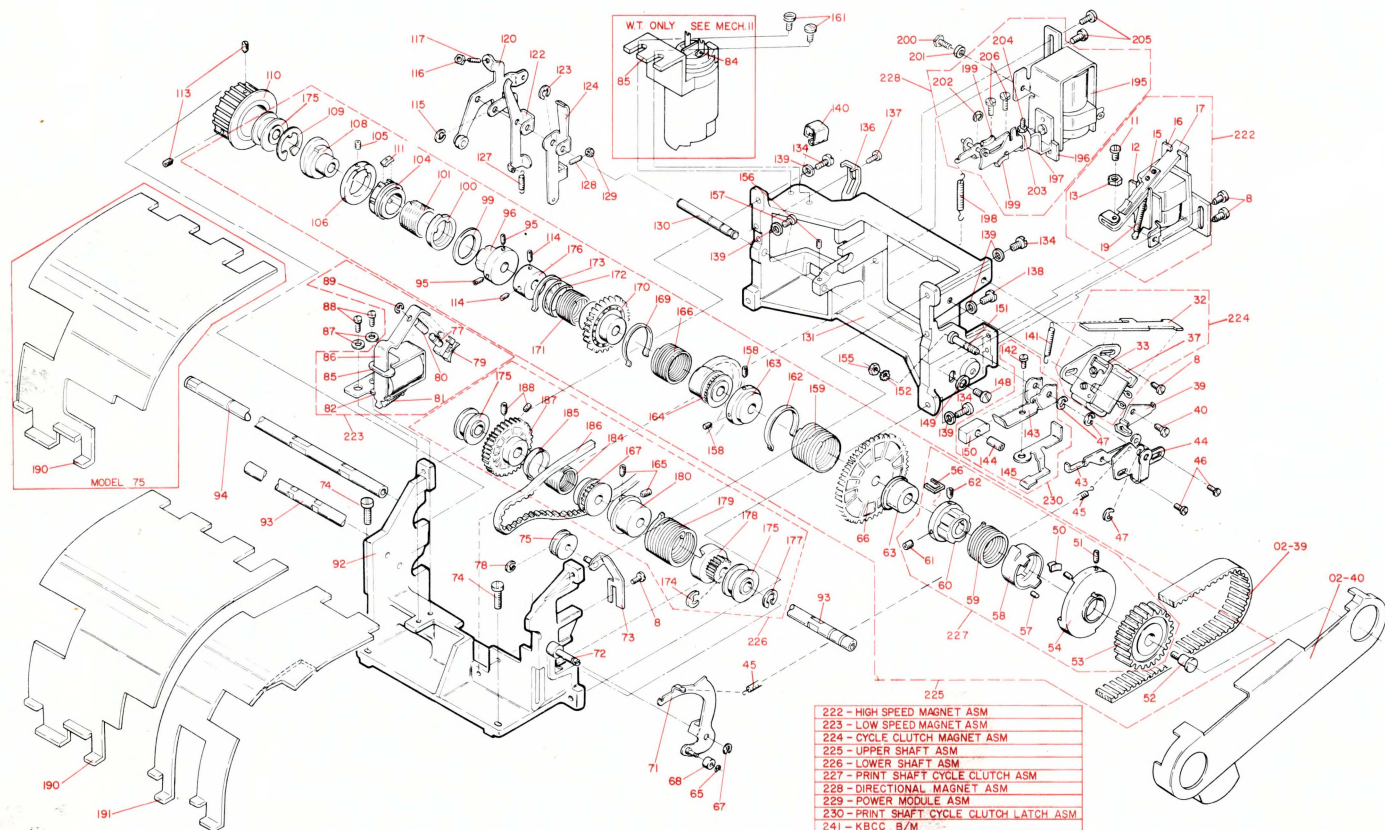
MECH. CODE

10

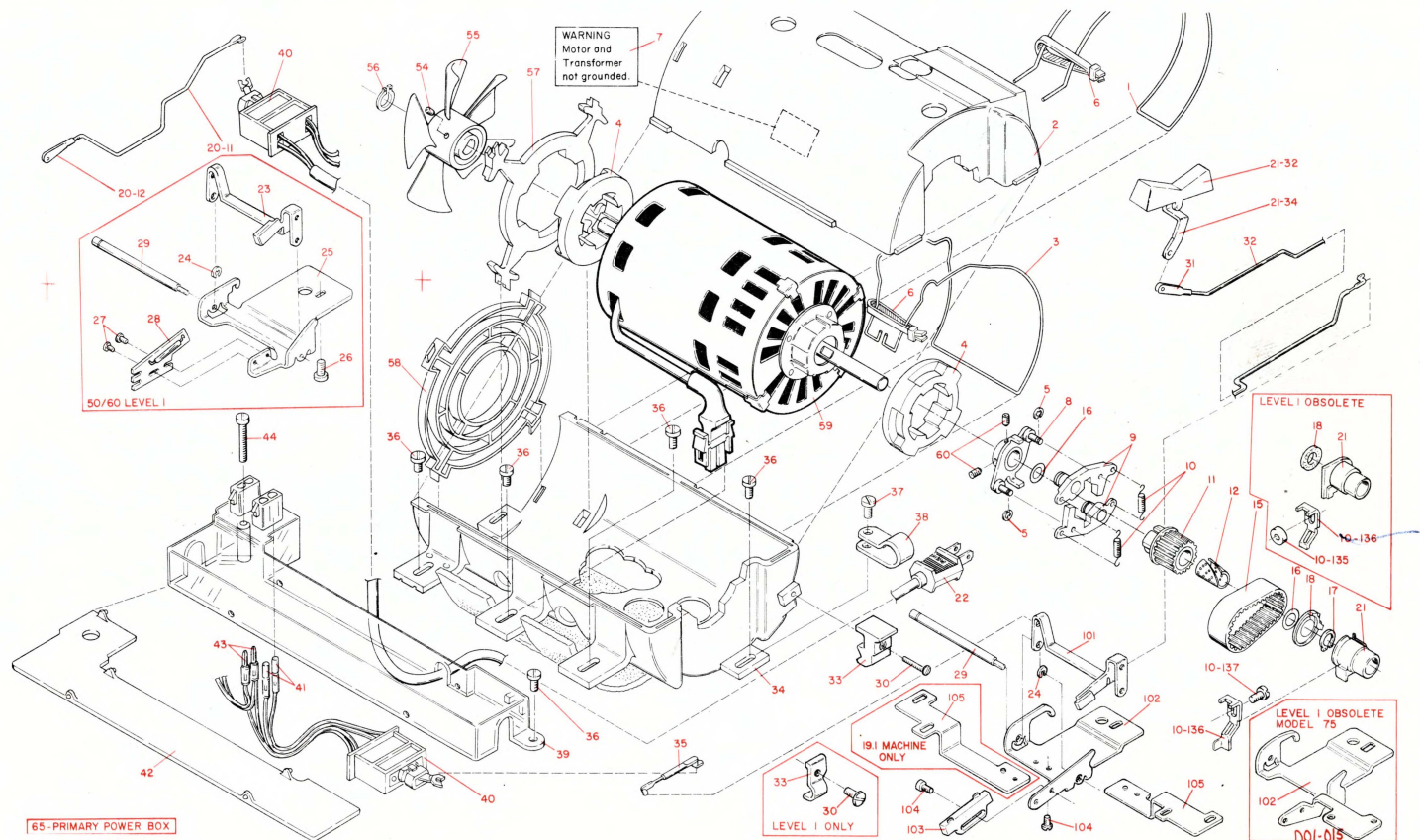
POWER MODULE LEVEL 1



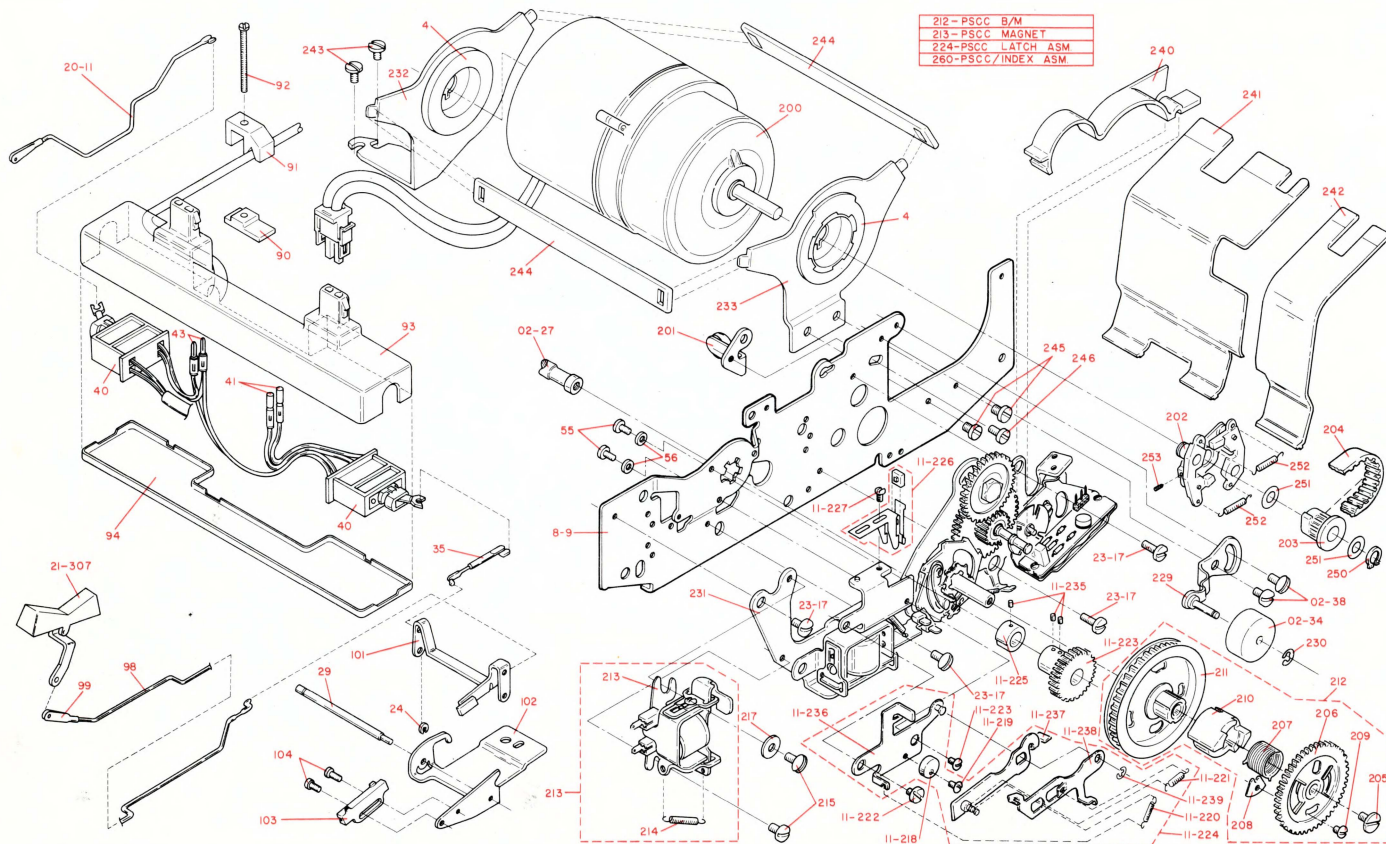
POWER MODULE



MOTOR AND DRIVE 50/60/75



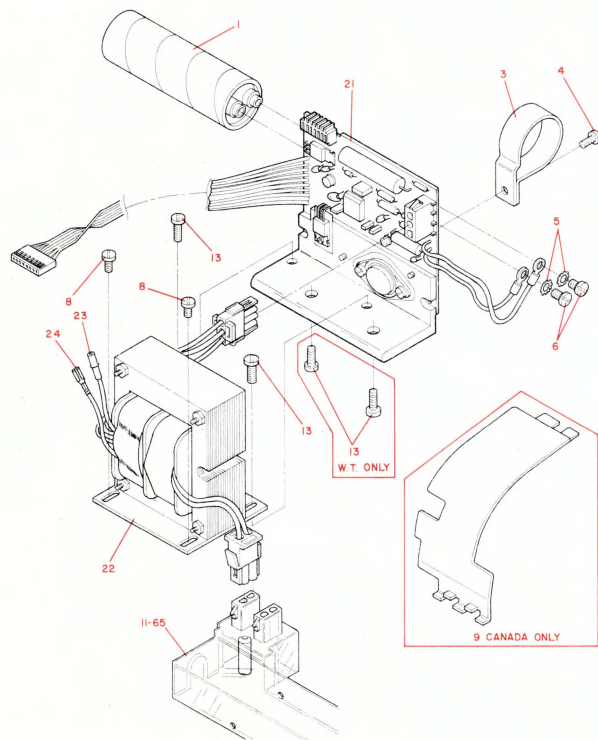
MOTOR AND DRIVE 85



MECH. CODE

12

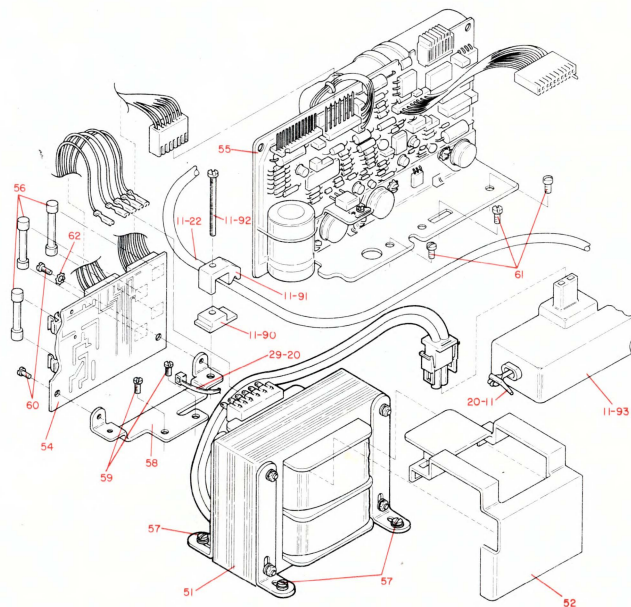
POWER SUPPLY 75



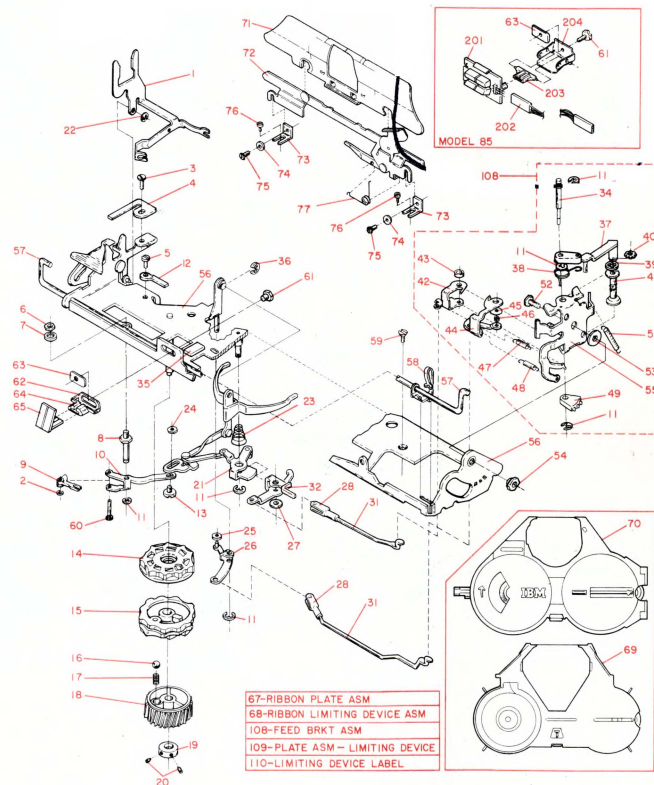
MECH. CODE

12

POWER SUPPLY 85



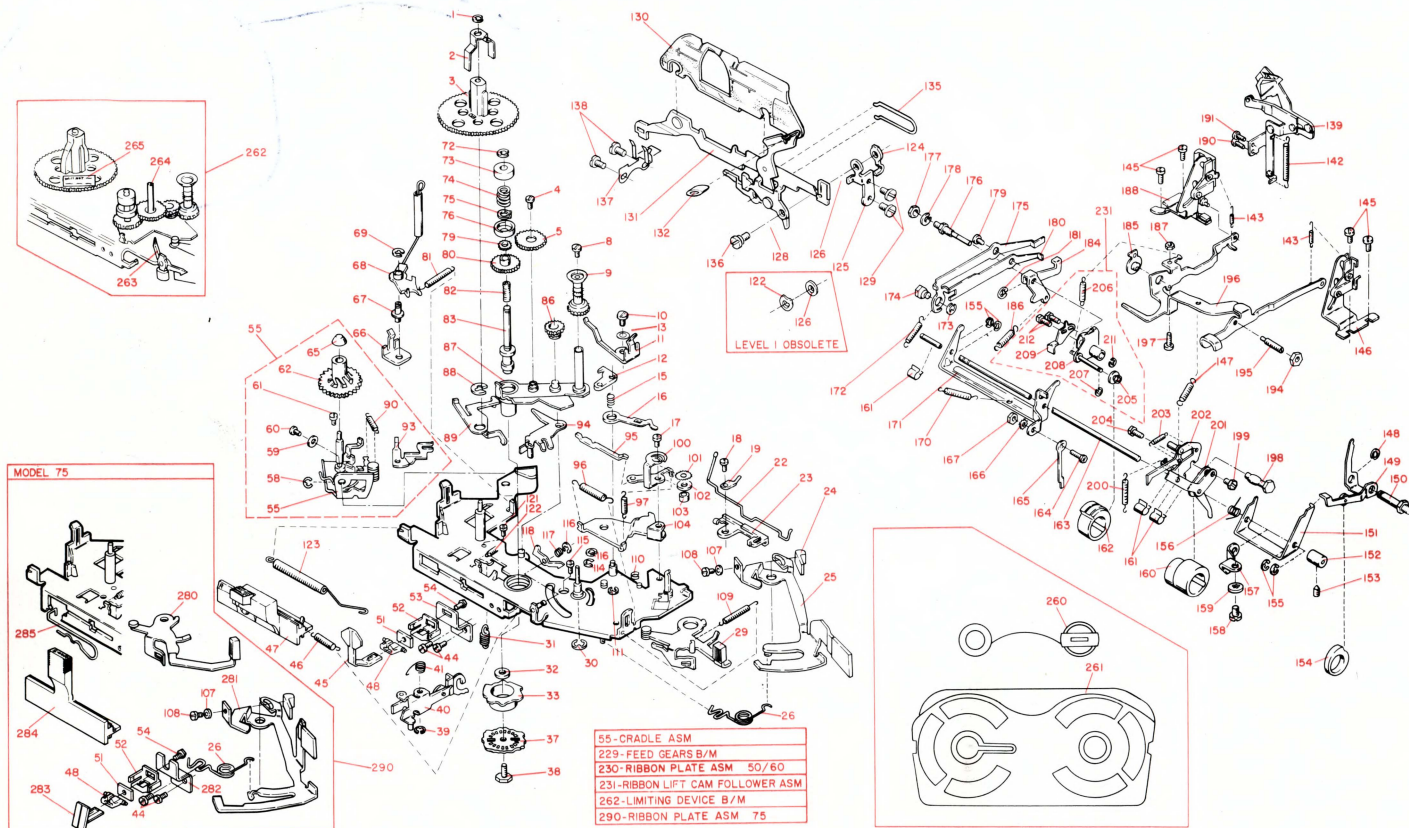
RIBBON CASSETTE SYSTEM



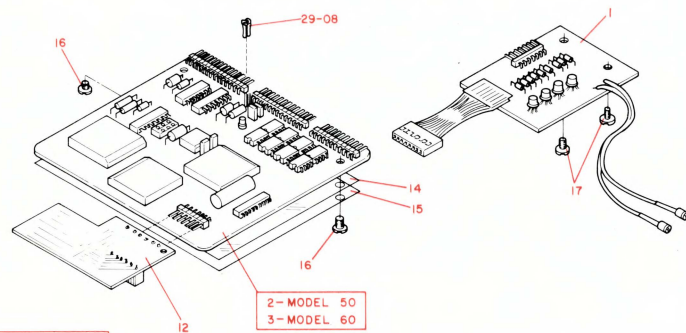
MECH. CODE

15

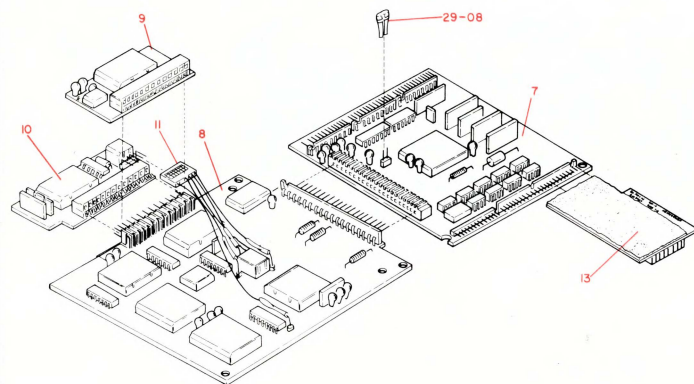
SELECTIVE RIBBON



ELECTRONICS 50/60/75

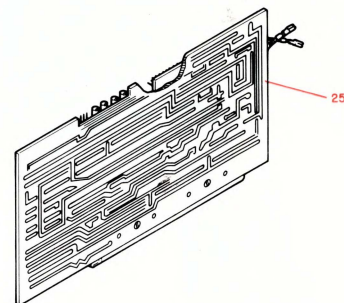
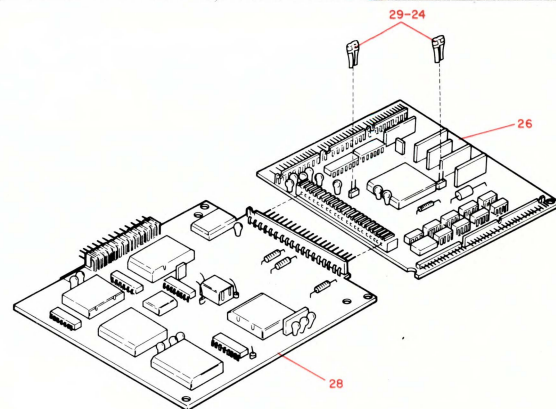
MECH. CODE
19

MODEL 50 & 60



MODEL 75

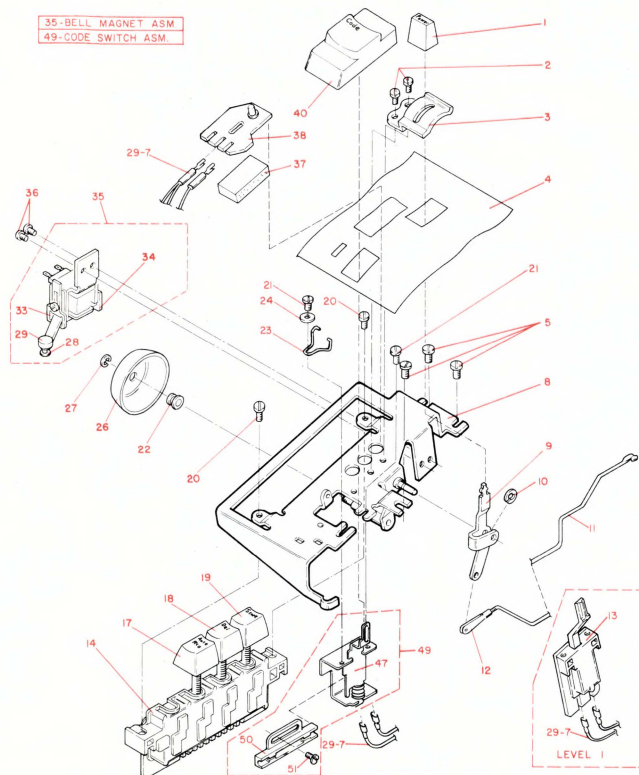
ELECTRONICS 85

MECH. CODE
19

MECH. CODE

20

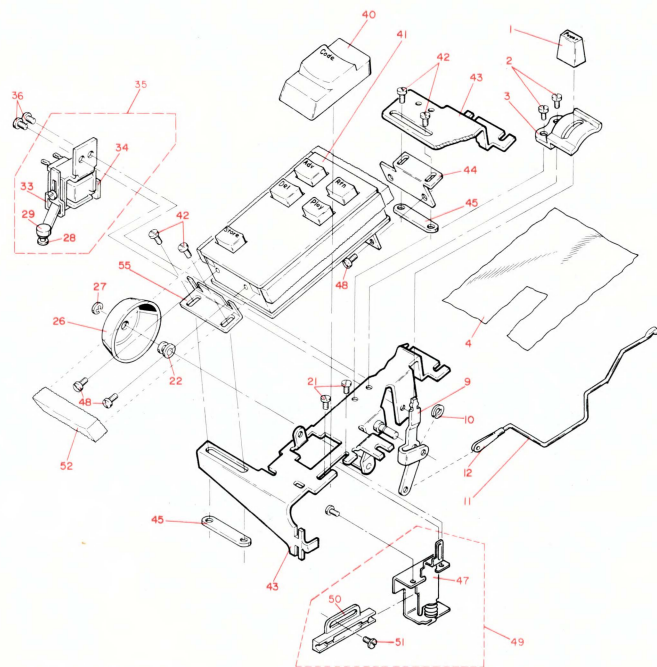
POWER SWITCH 50/60



MECH. CODE

20

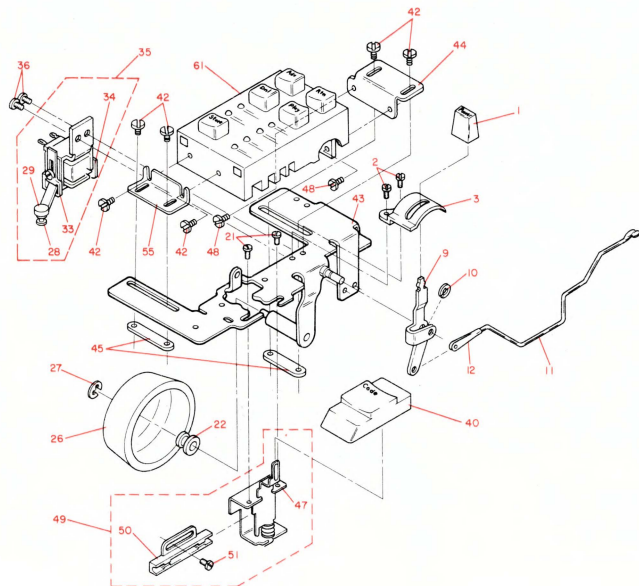
POWER SWITCH 75



POWER SWITCH 85

MECH. CODE

20



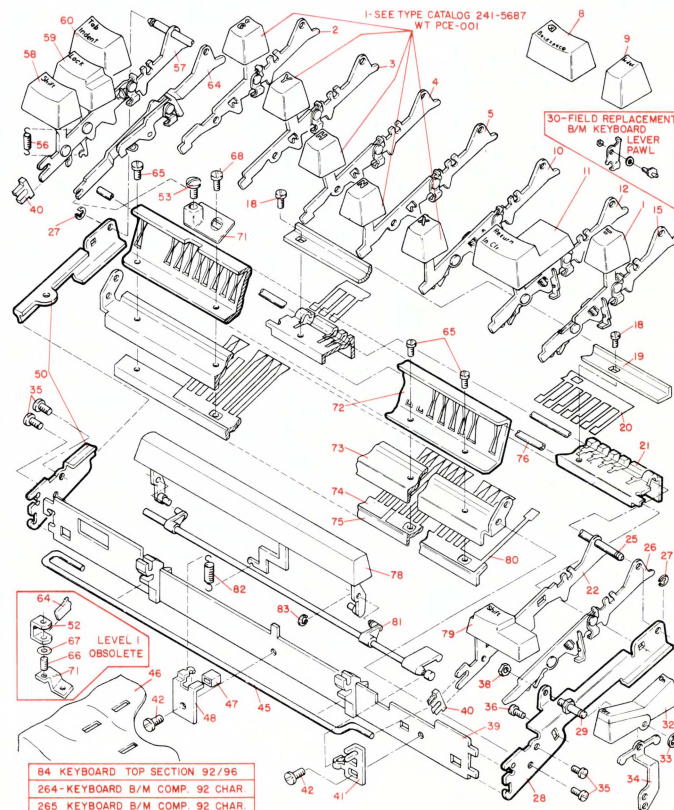
35-BELL MAGNET ASM

49-CODE SWITCH ASM

KEYBOARD TOP

MECH. CODE

21



84 KEYBOARD TOP SECTION 92/96

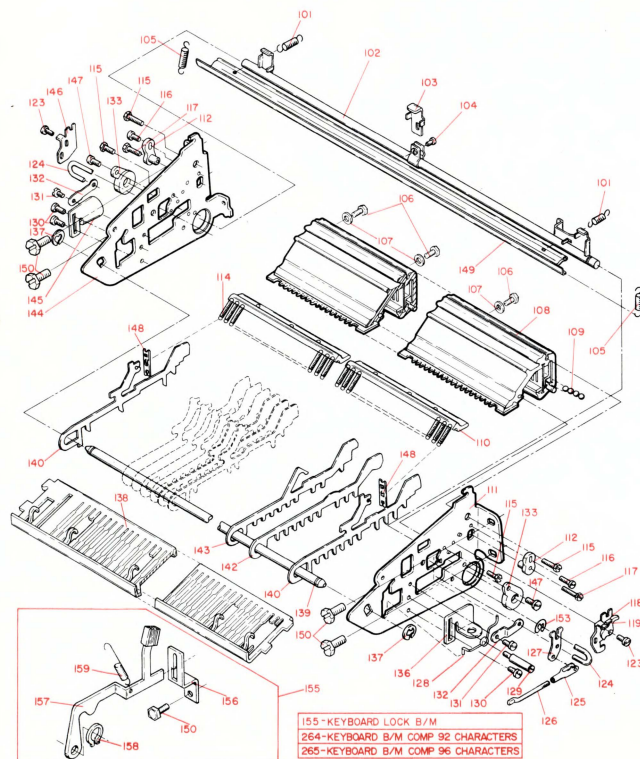
264-KEYBOARD B/M COMP. 92 CHAR

265 KEYBOARD B/M COMP. 92 CHAR

MECH. CODE

21

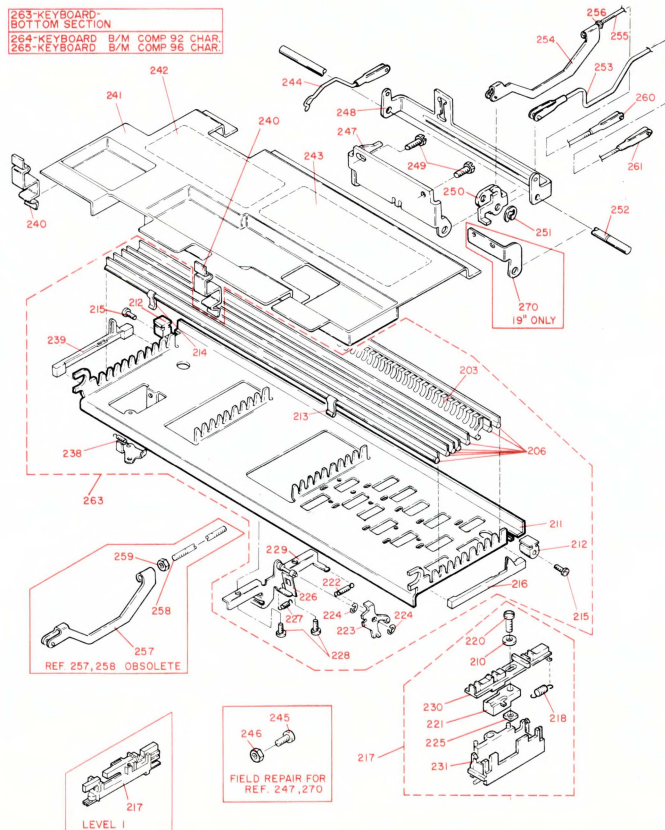
KEYBOARD CENTER



MECH. CODE

21

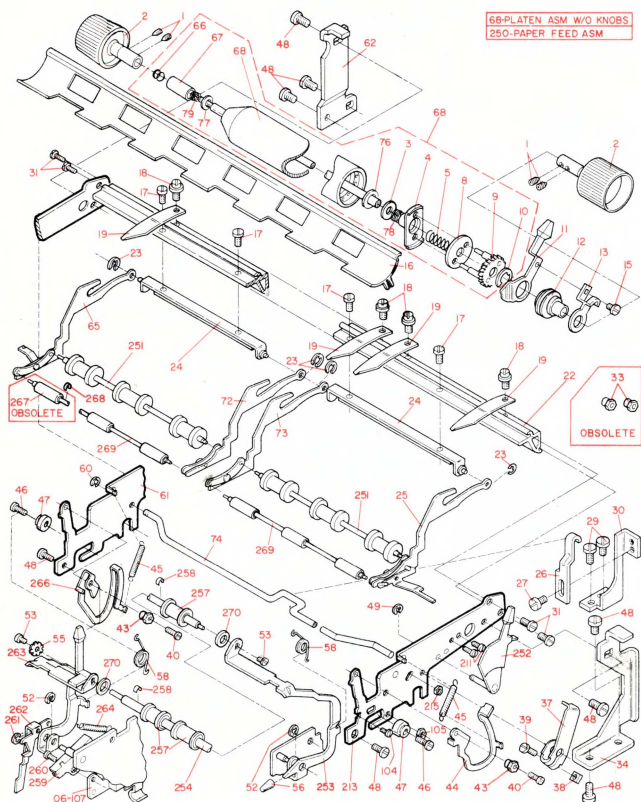
KEYBOARD BOTTOM



MECH. CODE

22

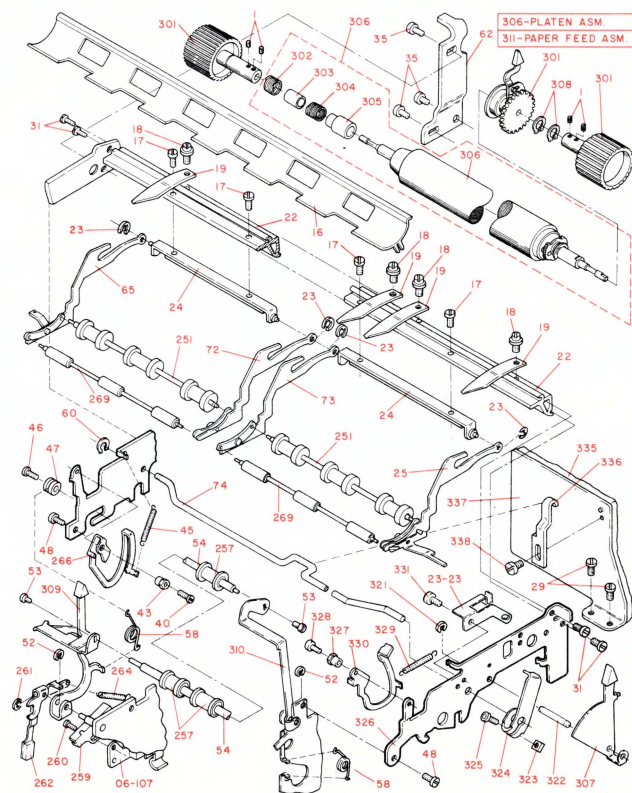
PAPER FEED 75



MECH. CODE

22

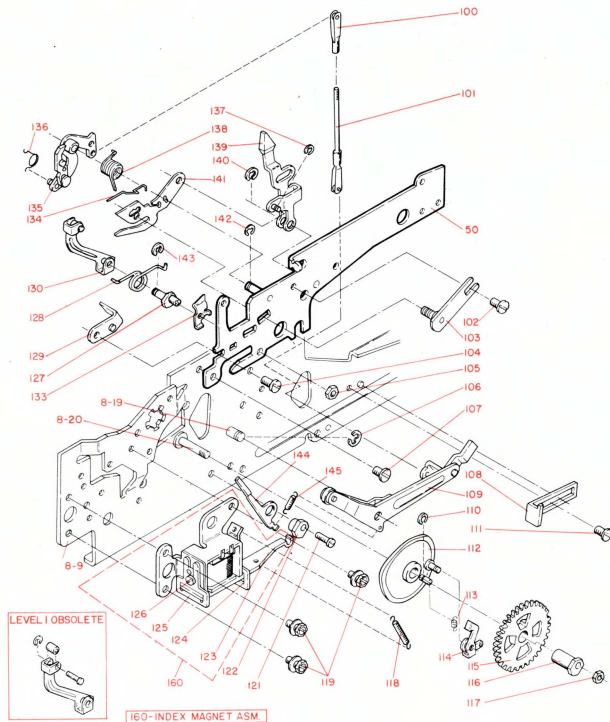
PAPER FEED 85



INDEX 50/60

MECH. CODE

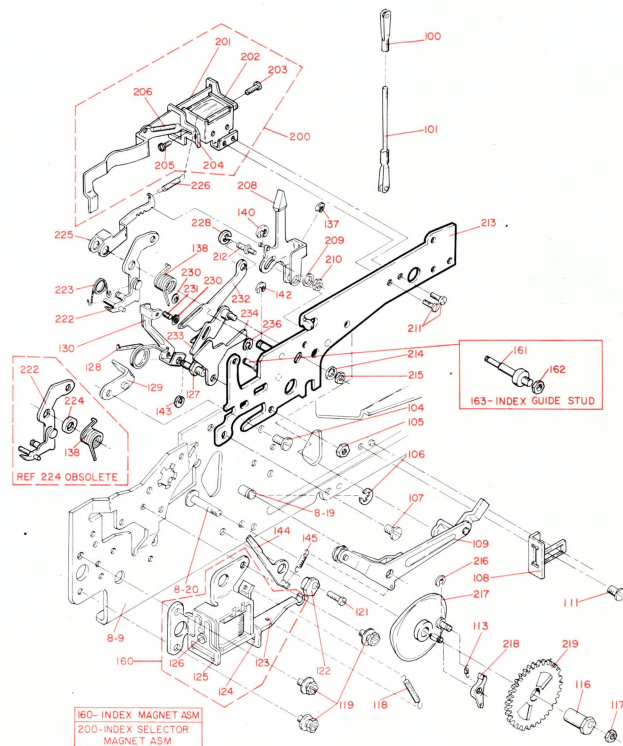
22



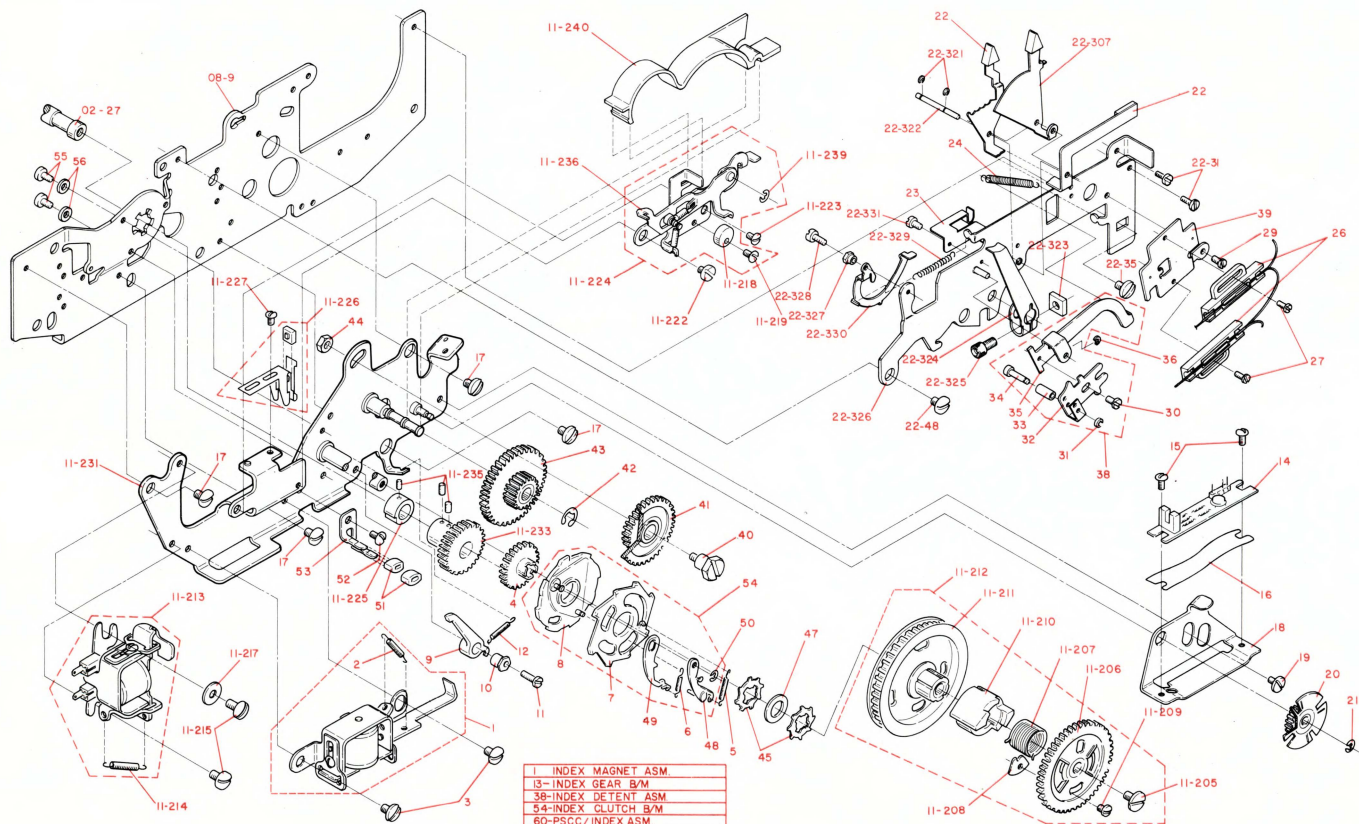
INDEX 75

MECH. CODE

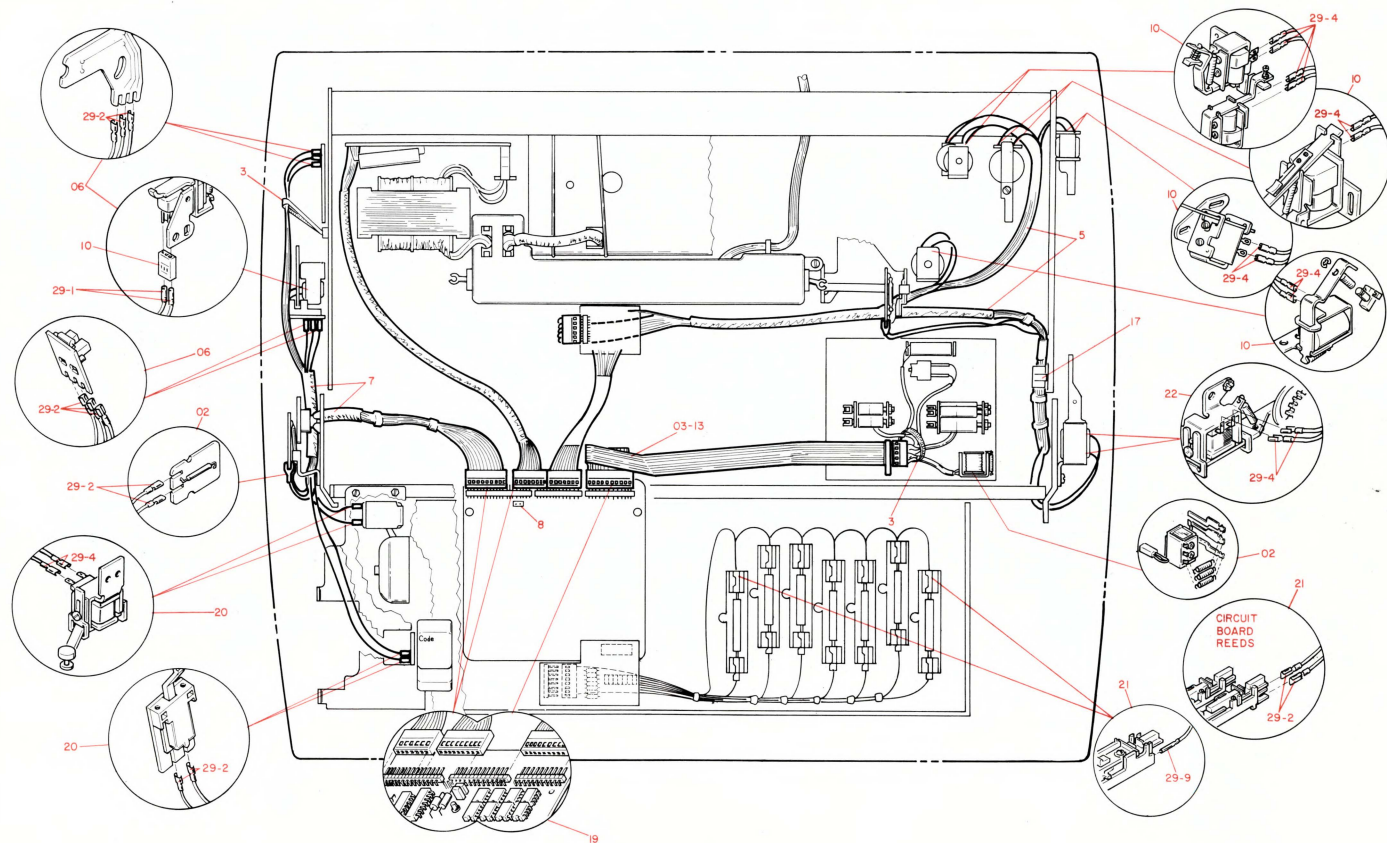
22



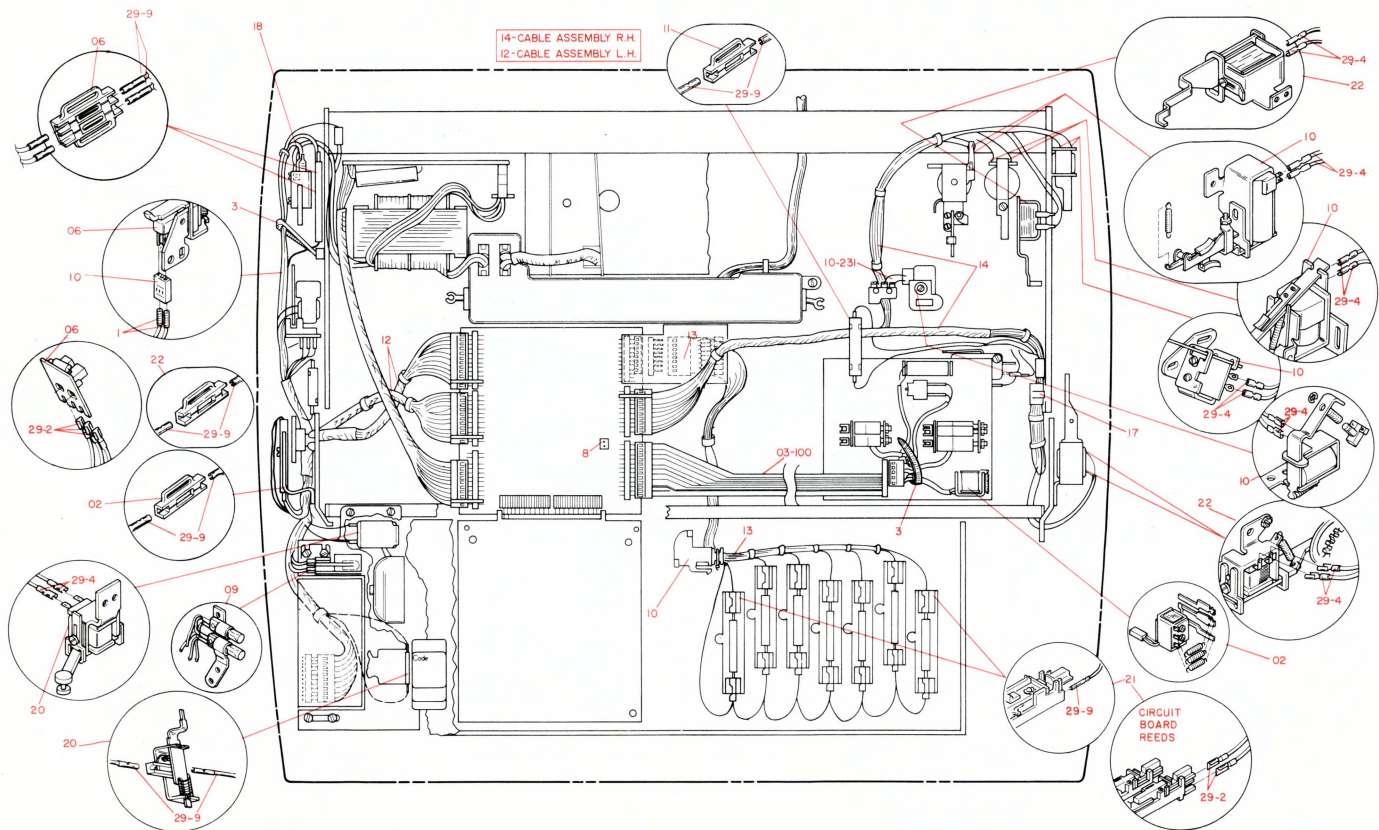
INDEX 85



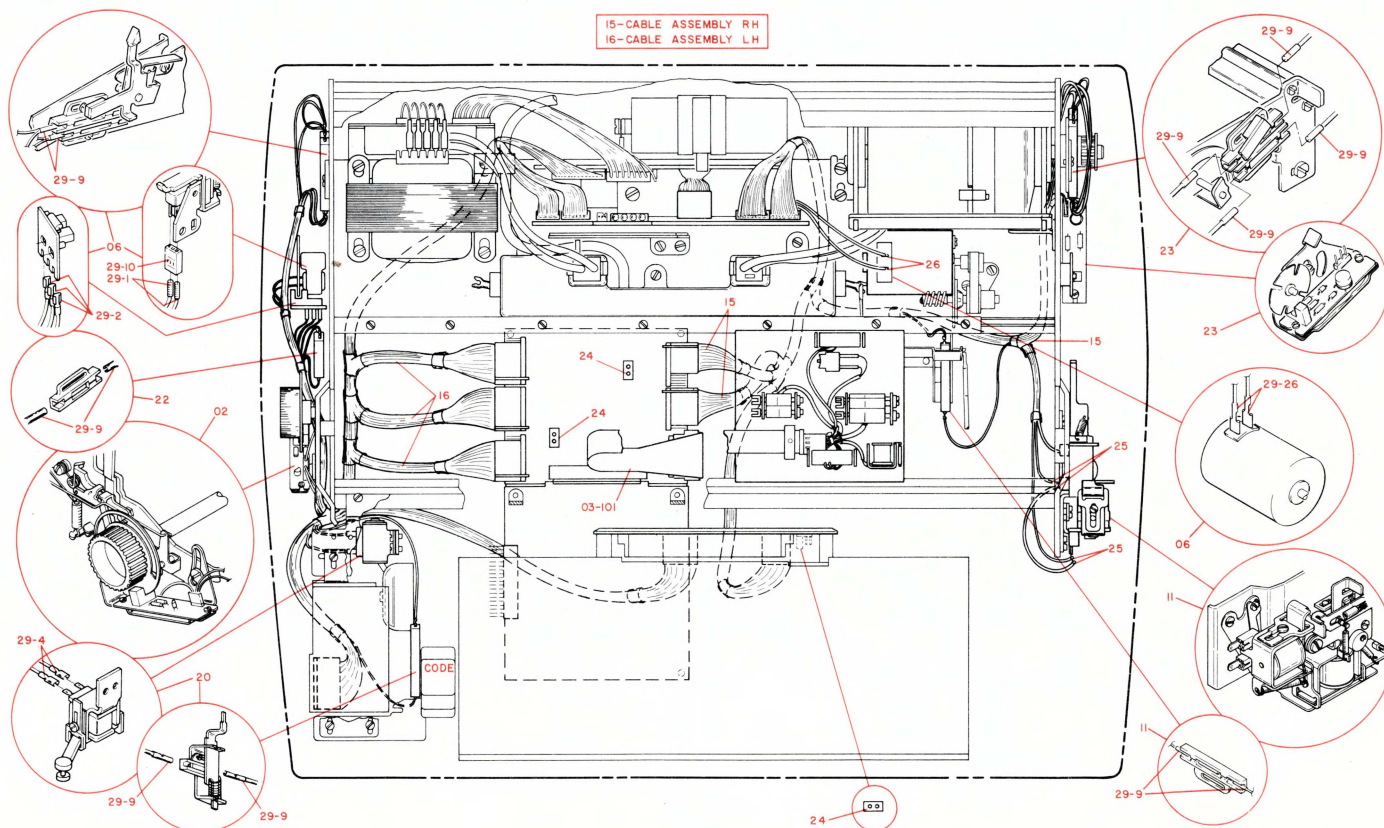
CABLES AND CONNECTORS 50/60



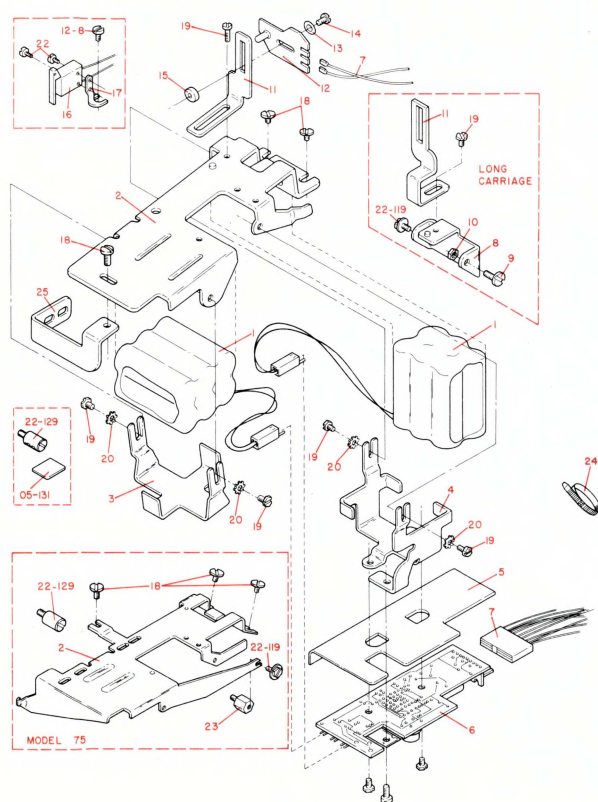
CABLES AND CONNECTORS 75



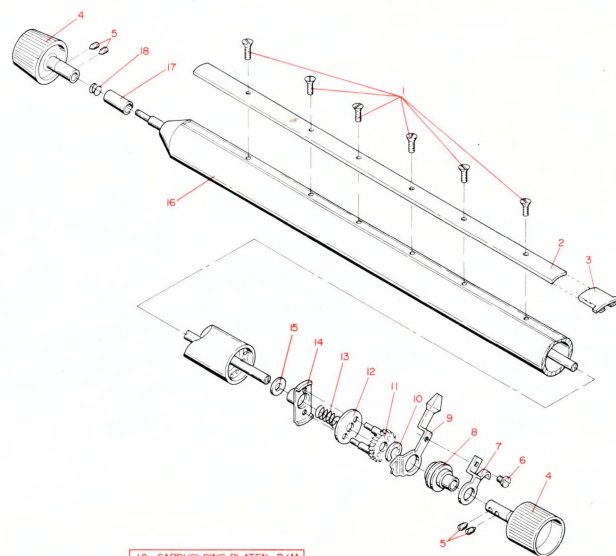
CABLES AND CONNECTORS 85



MECH. CODE

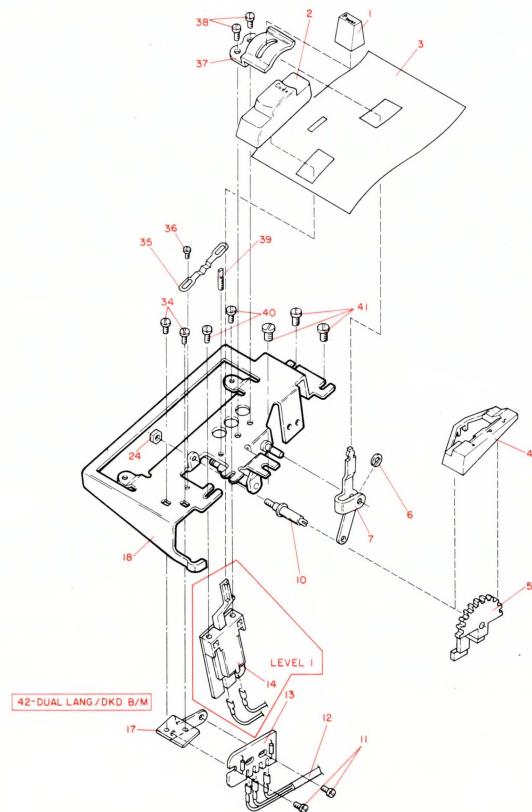
38**MEMORY PROTECTION 75/85**

MECH. CODE

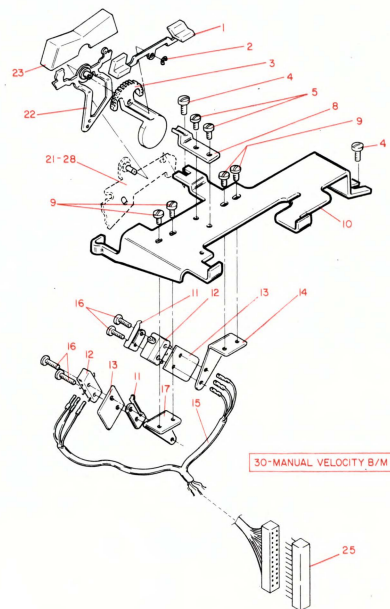
39**CARDHOLDING PLATEN**

DUAL LANGUAGE/DEAD KEY DISCONNECT

MECH. CODE

40**MANUAL VELOCITY**

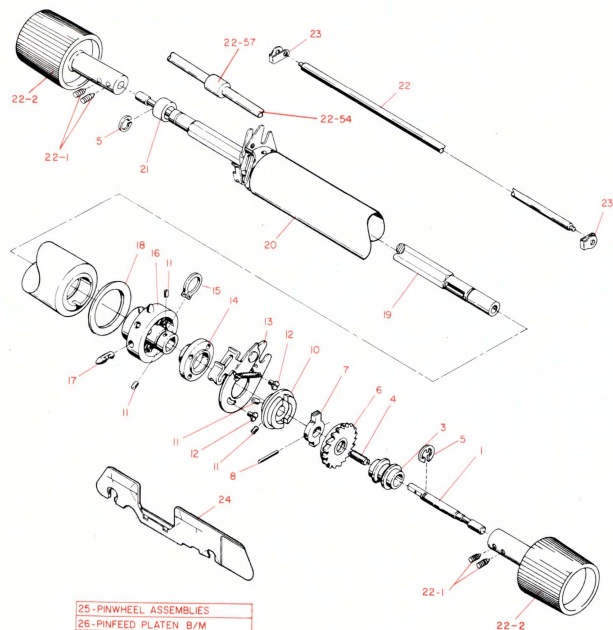
MECH. CODE

42

MECH. CODE

49

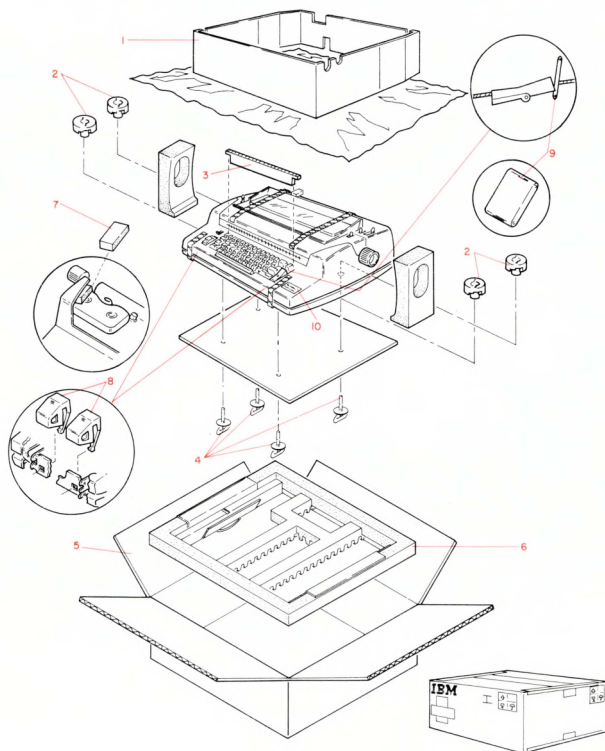
PIN FEED PLATEN



25-PINWHEEL ASSEMBLIES
 26-PINFEED PLATEN, B/M
 NOTE: ORDER CORE, & KNOBS
 SEPARATELY

MECH. CODE

U.S. & W.T. PACKING PARTS

MECH. CODE
65

U.S. & W.T. PACKING INSTRUCTIONS

MECH. CODE
65**PACKING INSTRUCTIONS**

1. Fasten bumper (65-8) onto front of keyboard as shown if the bottom cover is the molded plastic cover. Place top cover back on machine.
2. Move carrier to far left. Install foam pad over correction tape and ribbon and partially under cover (65-7).
3. Fold the glare shield forward and the page-end indicator backward. Place two pieces of tape across the acoustical hood.
4. Place label next to switch (65-10).
5. Place two pieces of tape over the center and bottom covers.
6. Insert wedge (65-3).
7. Insert keyboard wedge (65-9).
8. Thread screws through holes in bottom cover.

NOTE: If spacers are missing from machine, order four (4) each (65-2).

9. Tape bottom of carton together. Draw outer and inner flaps together as closely as possible before sealing. Tape should extend over ends of carton a minimum of 3.00" (76.2 mm).
10. Place bottom cushion in carton.
11. Place linecord under machine in void area, and place machine in cushion.
12. Place top cushion over machine.
13. To close top of carton, repeat step 9.

IBM 50/60/75/85 Electronic Typewriter
Adjustment Parts Manual
Order No. SR-28-0088-0

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-Cut Along Line-

CAUSE OF FAILURE	CODE	CAUSE OF FAILURE	CODE
Bent/Warped	01	Stripped	15
Binding/Sticking	02	Wiring Defective Or Routed Improperly	16
Broken/Cracked	03	Weak	17
Burned/Pitted/Burred	04	Worn	18
Jam-Paper/Tape/Card	05	No Trouble Found	19
Dirty/Contaminated/Corroded	06	Other	20
Loose/Solder Conn.	07		
Lubrication	08	Operator Preference*	22
Noise (Mech.)	09	Sound Distortion	23
Off/Off Registration	10	Beat The Operation	24
Open	11	Flicking	25
Out Of Adjustment	12		
Out Of Alignment	13	Noise Electrical	27
Shorted/Grounded	14	Low Contrast	28
		New Defective Part†	30

*Operator Preference — Adjustment due to operator opinion which is not a malfunction of the machine.

†New Defective Part — Part which failed at the time it was installed, or within 90 days thereafter.



International Business Machines Corporation
Customer Service Division

IBM Electronic Typewriter 50, 60, 75, 85 Adjustment Parts
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